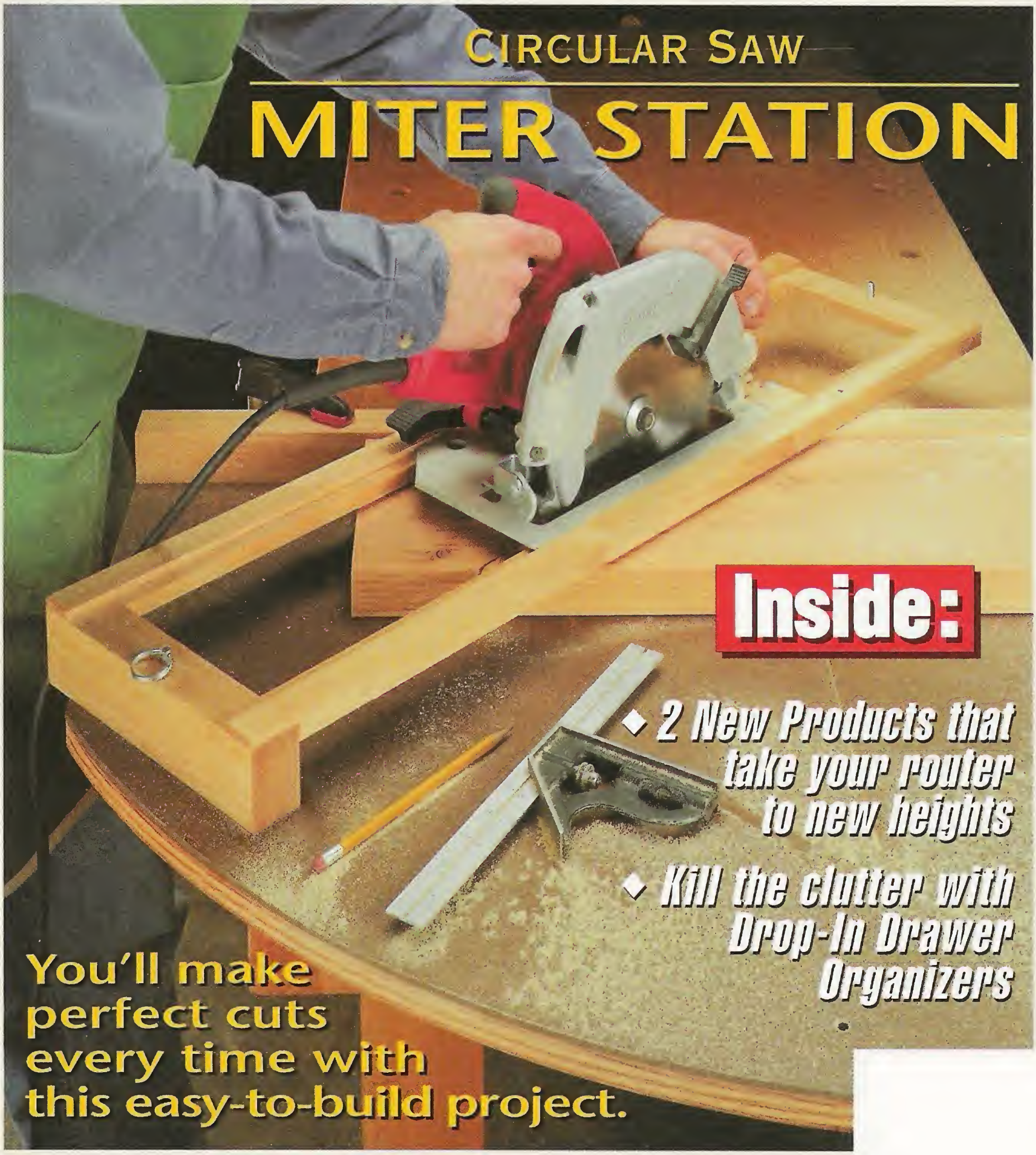
TOP 5 Router Jigs

SPECIAL: THE INSIDE STORY ON POWER TOOL BATTERIES

ShopNotes®

Vol. 10 Issue 56



CIRCULAR SAW
MITER STATION

Inside:

- ◆ *2 New Products that take your router to new heights*
- ◆ *Kill the clutter with Drop-In Drawer Organizers*

You'll make perfect cuts every time with this easy-to-build project.

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Issue 56 MARCH 2001

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EDITOR'S NOTE

Cutoffs

How much will a deep drawer hold? Sometimes too much. Unfortunately I learned this the hard way.

A few years back, I was building some shop cabinets. At the time I thought that big, deep drawers would be just the ticket for storing plenty of tools and supplies. Besides, it would be quicker to build a few deep drawers rather than several shallow ones.

Since then I've realized that bigger isn't always better. Sure the drawers hold a lot of stuff. The only problem is, I have to sort through all that stuff to find what I'm looking for.

As far as saving time, any time I might have saved in building has long been spent taking things out and putting them back to find what I need. You know how it is, the one item you're looking for always seems to be buried at the back of the drawer.

Well I finally decided it was time to make a change. But I didn't want to build a new set of cabinets. I just wanted a way to make the ones I have more useful.

That's the idea behind the drop-in drawer organizers featured on page 26. They're just wood boxes with lots of compartments that can be rearranged dozens of different ways

Other Changes – Speaking of changes, there have been a few other changes around here. First we have two new project designers. Chris Fitch and Craig Iseke. Chris has been designing and building projects for a living for many years. And Craig set up and ran a woodworking school in Canada.

Second, Vince Ancona will be helping out as an Associate Editor. Vince isn't really new, he has been working on our companion publication *Woodsmith* for several years.

And finally, my friend, Tim Robertson who has been Editor of *ShopNotes* has become the Editor of *Workbench*, our home improvement magazine. So I've picked up responsibilities as Editor here at *ShopNotes*. If you've been a longtime subscriber my name might ring a bell. I was the managing editor for *ShopNotes* when it started back in 1992, so I certainly feel right at home.

As always, we'll continue to provide you with practical tips and techniques, and unique project ideas that help you get the most out of your shop.

Terry

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ISSUE FIFTY-SIX

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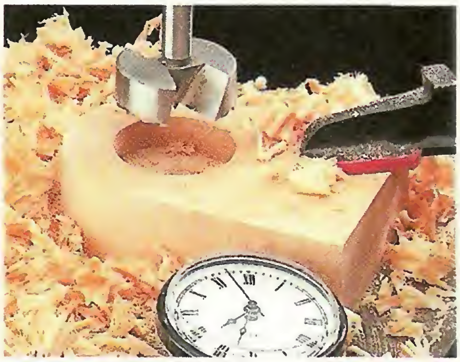

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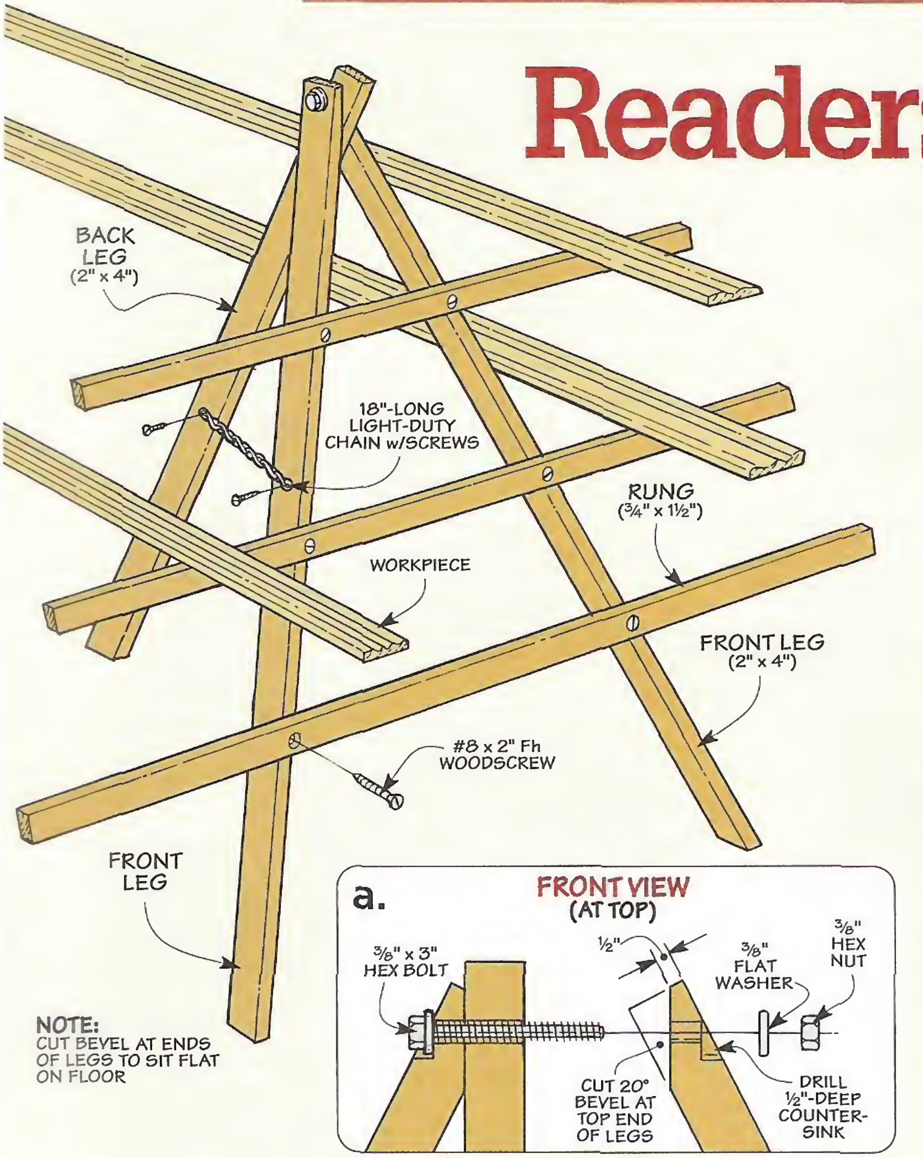
Readers' Tips


BACK LEG (2" x 4")
18"-LONG LIGHT-DUTY CHAIN w/SCREWS
RUNG (3/4" x 1½")
WORKPIECE
FRONT LEG (2" x 4")
#8 x 2" Fh WOODSCREW
FRONT LEG
NOTE: CUT BEVEL AT ENDS OF LEGS TO SIT FLAT ON FLOOR
a.
FRONT VIEW (AT TOP)
3/8" x 3" HEX BOLT
½"
3/8" FLAT WASHER
3/8" HEX NUT
CUT 20° BEVEL AT TOP END OF LEGS
DRILL ½"-DEEP COUNTER-SINK

Drying Easel

■ When we had our house built, I decided to make all the trim myself. I had several hundred feet of trim to finish and install. The finishing was easy. The challenge was finding a place to set all the pieces of trim while they were drying. My workbench wasn't long enough and, even if it was, I could only place five or six lengths of trim on the bench at one time. So instead, I came up with a simple solution. I made a pair of drying "easels" to hold the trim pieces, see drawing at left.

These easels work like a pair of ladders. Horizontal "rungs" support the ends of the trim pieces. The open design of the easels and the multiple rungs allow you to dry several pieces of trim at once.

The base of each easel is constructed out of a few scrap pieces of 2x4 stock. The two front legs are mitered on the ends so they form an inverted "V" shape. Then a pivoting back leg is sandwiched in between the two front legs to provide support to the "V". A hex bolt, a lock nut, and a couple of washers hold all three legs together (Detail 'a'). (You'll need to drill an angled hole near the end of each front leg for the hardware.) A short length of chain is used to connect the back leg with one of the front legs, in order to prevent the easel from collapsing. The "rungs" are just some pieces of $^3/_4$"-thick stock that are screwed to the front legs.

Mark Vogel
Ann Arbor, Michigan

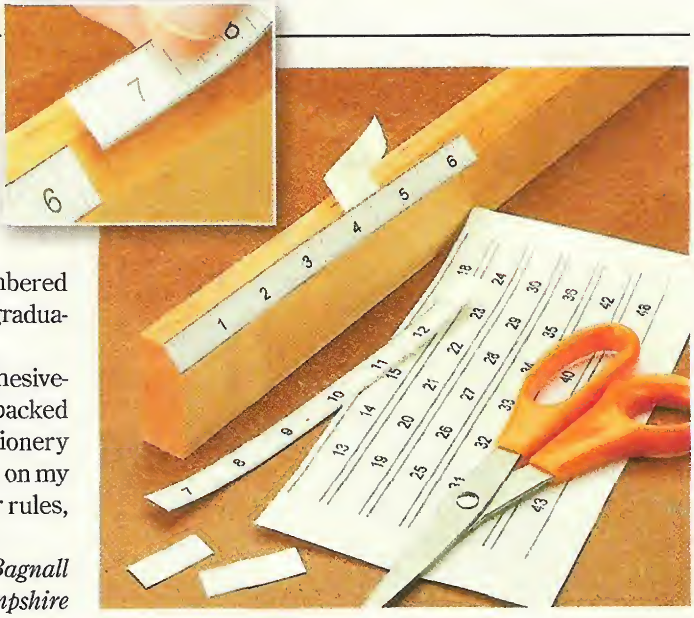
Stick-On Rules

■ I make a lot of jigs to use in my shop. And I find it handy to add a stick-on rule or measuring tape to many of these jigs. Although you can buy stick-on measuring tapes, they can get to be expensive. So I make my own.

I start by using a CAD program on my personal computer to create a set of rules with numbered inch marks and graduations. You can make the graduations in any increment you want.

I print the rules out on a sheet of glossy adhesive-backed paper, see photo at right. (Adhesive-backed paper is available at most office supply or stationery stores.) Then I simply cut them out and stick them on my jigs or tools, wherever they are needed. For longer rules, I butt two or three together, see inset photo.

Ralph Bagnall
Goshen, New Hampshire



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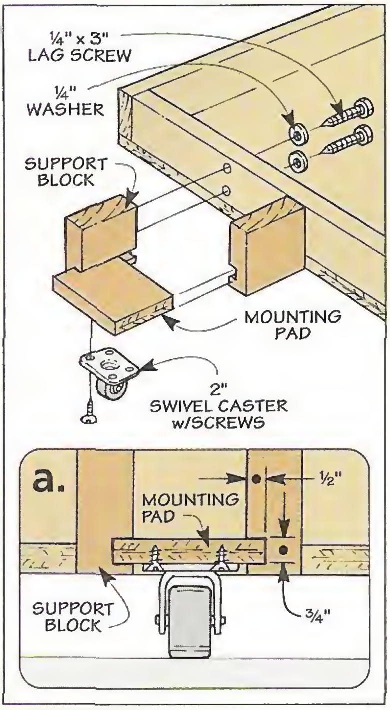
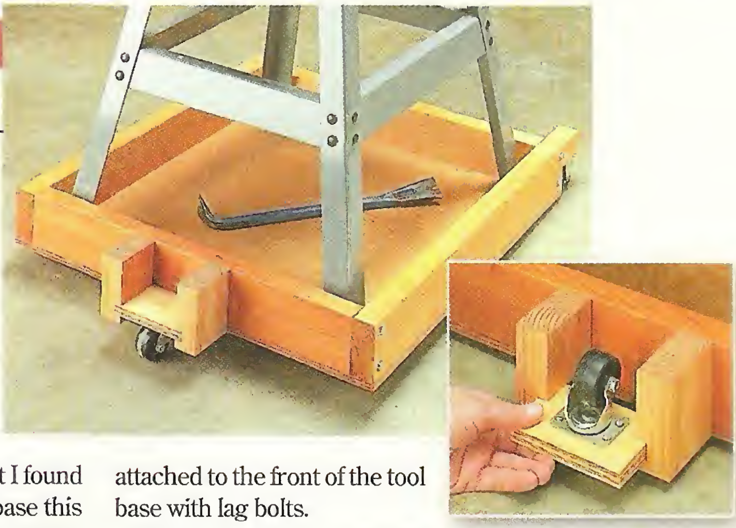
Roll-Around Base





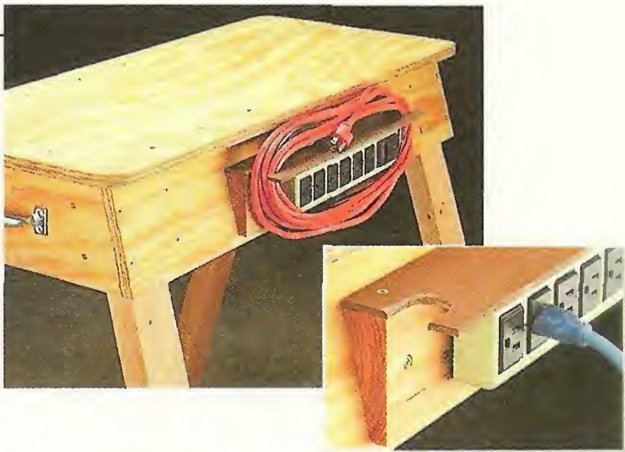
■ I recently built the roll-around tool base you featured in issue No. 22 for my table saw. This base has two casters mounted to the back. To roll it around, a long handle is used to lift the front of the base until the casters at the back contact the floor. But I found it difficult to maneuever the base this way. So instead, I added a "third wheel," see photo.

This third wheel is removable. It's just an additional caster that's centered on the front of the base. The caster is mounted to a ¾"-plywood *mounting pad* that slides in between a pair of 2x4 *support blocks*, see drawing. A dado is cut in each support block to receive the mounting pad. Then the support blocks are attached to the front of the tool base with lag bolts.

When I want to move my saw, I simply use a pry bar to lift the base enough to slide the caster and mounting pad into the dadoes. Then when I want to set the base back down, I remove the caster, turn it upside down, and store it back between the support blocks, see inset photo above.

Doug Tapper
Marietta, Georgia

Cord Wrap

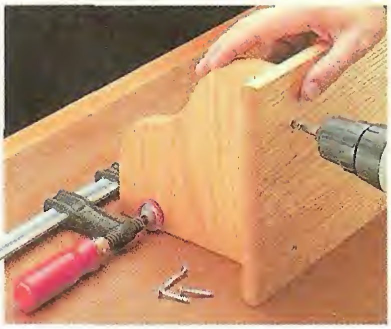


■ I really liked Randy Hoy's portable workbench (see Readers' Tips, issue No. 53). The power strip mounted on the side of the workbench is especially handy. But I made a slight modification to improve it.

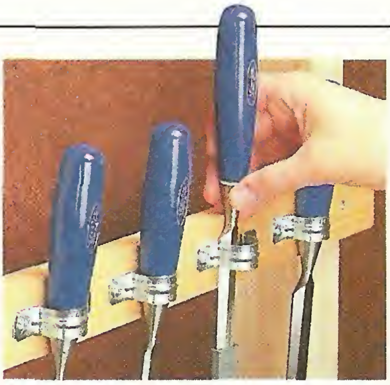
I simply mounted the power strip to a wood block that was beveled on one face to match the angle of the splayed legs of the workbench (15°). Then I took a piece of ¼" hardboard, cut a notch at each end, and screwed it to the top edge of the beveled block. The hardboard prevents sawdust from falling into the holes in the power strip. And the notches provide a convenient place to wrap an extension cord for the power strip.

Ryan Grimm
Arlington, Massachusetts

Quick Tips



▲ *Whenever he needs an extra hand,* Allan Fredrickson *of Novelty, OH uses a small bar clamp to support a workpiece on edge.*



▲ *For a quick, inexpensive tool rack,* Ryan Vogt *of Urich, MO fastens electrical conduit straps to a narrow board.*

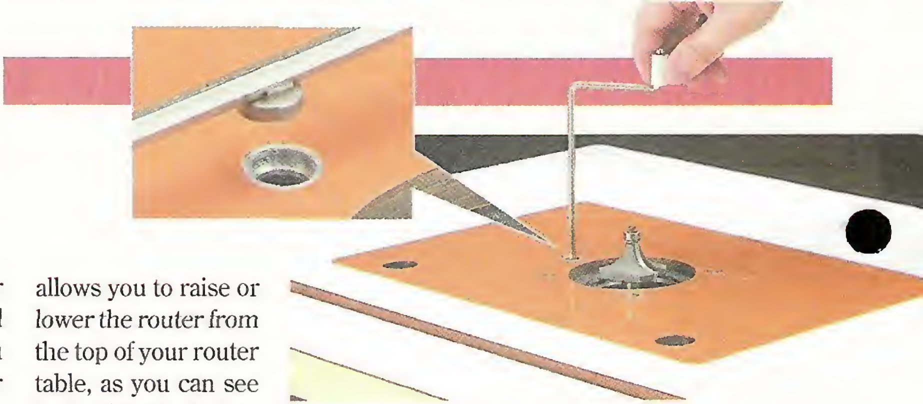
Send in Your Shop Tips

If you have a unique shop tip, we'd like to consider featuring it in one or more of our print or electronic publications.

We'll pay up to $200 for a tip we publish. Just write down the tip and mail it to *ShopNotes*, Attn.: Readers' Tips, 2200 Grand Ave., Des Moines, IA 50312. Or FAX it to 515-282-6741, or send us an e-mail at shopnotes@shopnotes.com. Please include your name, address and daytime phone number in case we have any questions.

Tool Talk

TOOLS OF THE TRADE



■ Adjusting the height of a router bit in a router table can be a real pain in the neck (literally). You have to reach under the router table top for the router controls while straining your neck trying to keep one eye on the bit so you can see how much you're moving it up or down. Well thankfully, now there's a better way. In fact, there are *two* ways.

ROUTER RAIZER

Remember when it was the craze to "lift" a vehicle off its axle? Well, the Router Raizer is kind of like a "lift kit" for your router. It replaces the "stock" height control on your plunge router and allows you to raise or lower the router from the top of your router table, as you can see in the drawing below.

Crank it Up – When you first open the box containing the Router Raizer, you might be surprised to see that it's little more than a bag of hardware. (See Sources, p. 31) The key components of the Router Raizer are a precision-machined lead screw and mainshaft which work together to raise or lower the router. A removable speed wrench fits through a small access hole in the top of the router table and engages the end of the mainshaft, see photo above. Each full turn of the wrench raises or lowers the bit exactly 1⁄16", so you can gauge your adjustments.

The Router Raizer will work with over a dozen different popular models of plunge routers on the market today. (Bosch is one notable exception). However, it doesn't work with fixed-base routers.

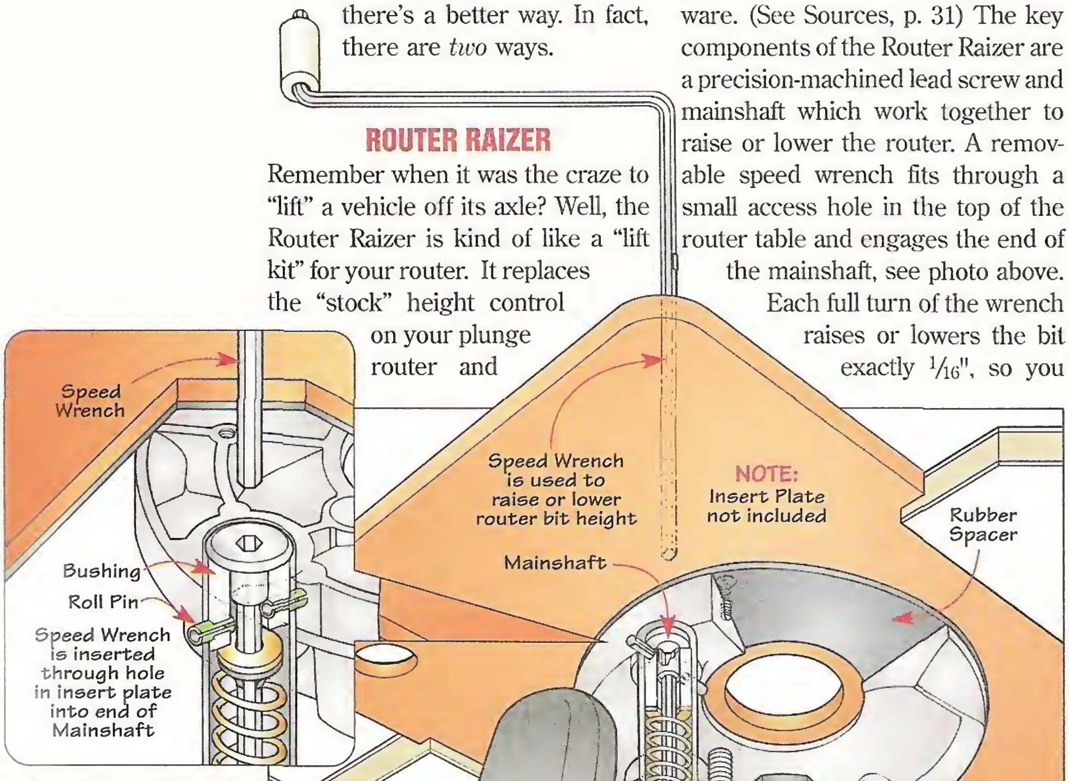
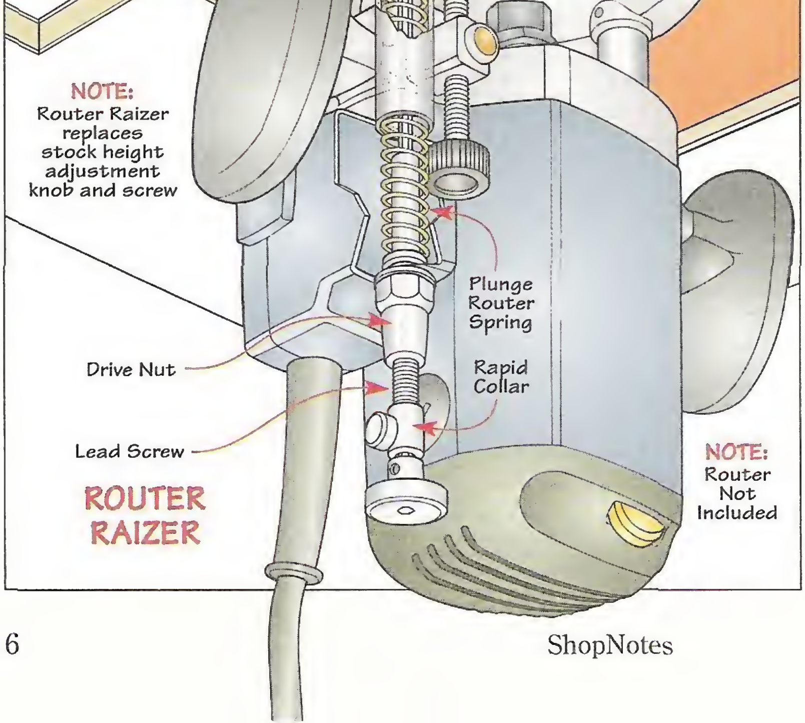
One of the nice things about the Router Raizer is that you don't have to sacrifice the plunge capability when using your router out of the router table. And as shown in the margin photo to the left, a drive knob at the end of the mainshaft allows to adjust the height of the router just as you would normally.

Installation – *Installing a Router* Raizer isn't too difficult, but it does require you to slightly modify your router. (I had to enlarge a couple of holes in the router base.) Don't worry — there are separate instructions for each model of router.

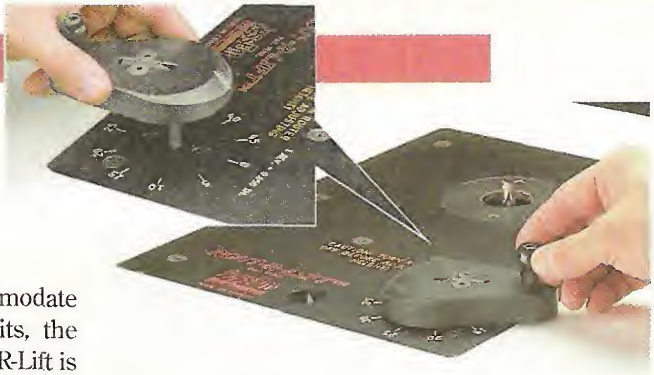
It took me about an hour and a half to install the Router Raizer on my router. (Note: Depending upon your router, you may have some unused parts left over.)

Access Hole – Because the Router Raizer installs directly on your router, you don't need to make any major changes to your router table. All you have to do is drill a small access hole in the insert plate for the crank. To prevent dust from clogging this hole, a tiny dust cover is provided. A magnet on the crank allows you to quickly lift the cover out of the access hole, as shown in the inset photo above.

Price – So what does all this convenience cost? The Router Raizer sells for about $90. That may seem like a lot for a router "accessory." But I was impressed with how smoothly the Router Raizer works. The parts are well-machined and it's apparent



Speed Wrench
Bushing
Roll Pin
Speed Wrench is inserted through hole in insert plate into end of Mainshaft
Speed Wrench is used to raise or lower router bit height
NOTE: Insert Plate not included
Rubber Spacer
Mainshaft
NOTE: Router Raizer replaces stock height adjustment knob and screw
Plunge Router Spring
Drive Nut
Rapid Collar
Lead Screw
NOTE: Router Not Included
ROUTER RAIZER

▲ *Fine Tuning. When hand routing, a top drive knob allows you to make fine height adjustments.*



that a lot of thought went into the design. If you do a lot of work on a router table, it's worth the money.

ROUT-R-LIFT

Like the Router Raizer, the Rout-R-Lift (see photo at right) also allows you to adjust the height of your router bit without having to reach under the top of the router table. But as you can see in the drawing below, the Rout-R-Lift is completely different. Instead of moving just the bit and motor housing, the Rout-R-Lift raises and lowers the entire router.

Essentially, the Rout-R-Lift is a heavy aluminum carriage that rides up and down on a couple of 3/4"-dia. steel rods. The router is mounted directly to this carriage and is raised and lowered by turning a removable crank on top of the router table. Thanks to a belt and pulley system, the carriage travels smoothly and effortlessly. The entire assembly is mounted to the underside of a 3/16"-thick, machined aluminum plate that doubles as a router table insert plate.

Installation – Installing the Rout-R-Lift is really no more difficult than installing a router table insert plate. You simply cut an opening in your router table top and then rout a rabbet around the opening to hold the Rout-R-Lift. (Some basic installation instructions are included with the Rout-R-Lift.)

Note: If you plan to add the Rout-R-Lift to your existing router table, you may have to enlarge the opening in your router table.

To attach the router, you simply remove the base plate from your router base and transfer the screw hole locations to the aluminum carriage plate on the Rout-R-Lift. After drilling the holes, the plate is simply screwed to the base of your router.

Indexing – Index marks etched into the top of the Rout-R-Lift let you know how much you're raising or lowering the bit, see inset photo above. Each complete turn of the crank moves the router .050".

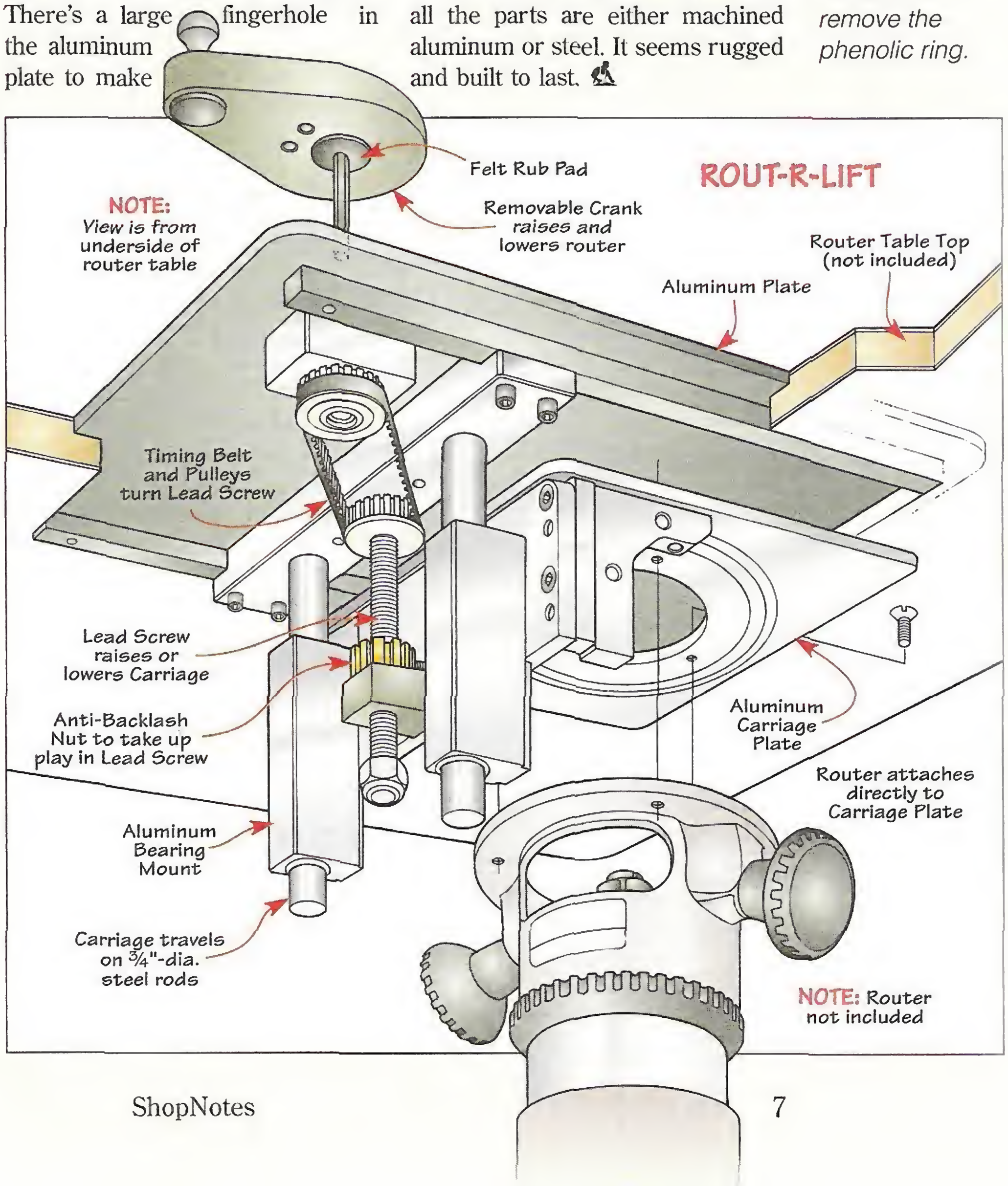
One of the main advantages of the Rout-R-Lift is that it works with both fixed-base and plunge-type routers. So it's compatible with just about any router you may have.

Insert Rings – To accommodate different diameter router bits, the aluminum plate on the Rout-R-Lift is fitted with a removable, phenolic insert ring, see margin photo at right. Tabs are machined on the edge of the ring to allow it to lock into the plate. A set of four additional insert rings of different sizes can be purchased separately (see Sources).

Bit Changes – One drawback I noticed with the Rout-R-Lift is that the carriage and steel rods get in the way when you want to change router bits. One way around this is to completely lift the router and Rout-R-Lift out of the table for bit changes. There's a large fingerhole in the aluminum plate to make it easier to lift the assembly out, but it doesn't do much to help with the weight — it's quite heavy.

Price – At $200, the Rout-R-Lift might seem a bit pricey (see page 31 for sources). But if you're building a router table from scratch, the cost is a little bit easier to justify when you consider the money you will save by not having to purchase a separate insert plate. And I was impressed by the quality construction of this product. Nearly all the parts are either machined aluminum or steel. It seems rugged and built to last.

▲ *Insert Ring. A spanner wrench is included with the Rout-R-Lift to remove the phenolic ring.*


ROUT-R-LIFT
NOTE: View is from underside of router table
Felt Rub Pad
Removable Crank raises and lowers router
Router Table Top (not included)
Aluminum Plate
Timing Belt and Pulleys turn Lead Screw
Lead Screw raises or lowers Carriage
Anti-Backlash Nut to take up play in Lead Screw
Aluminum Carriage Plate
Router attaches directly to Carriage Plate
Aluminum Bearing Mount
Carriage travels on 3/4"-dia. steel rods
NOTE: Router not included

Top 5

Router Jigs

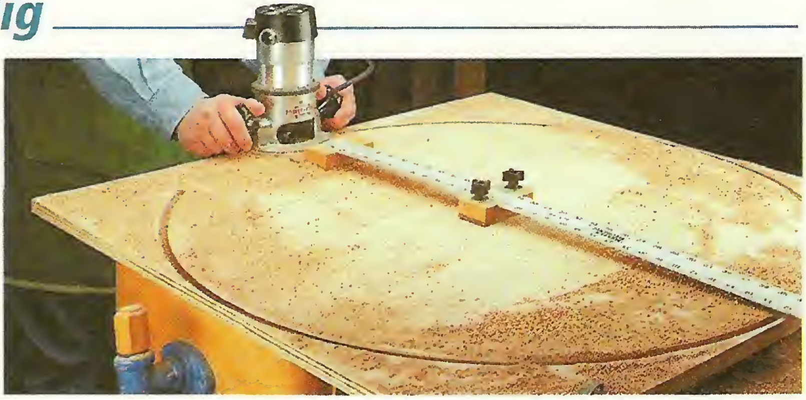
Have you unlocked the hidden potential of your router? You can with these five top-notch router jigs.

One of the first power tools I bought was a hand-held router. Along with a handful of bits, I was able to rout decorative profiles along the edges of my workpieces. But it didn't take long to realize there was more to a router. The trick to unlocking its potential is a few shop-made jigs.

Five Jigs – Now, I'm not talking about a couple throw-away jigs that you only use once or twice. As a matter of fact, you'll want to keep the five jigs shown on the next few pages around for a long time.

That's because with these jigs, you can rout large circles, cut perfect dadoes and mortises, or easily trim edging flush with plywood. But the really nice thing about these jigs is they're simple to make *and* they don't require a lot of expensive materials or hardware. In fact, you can probably build most of these jigs from scrap materials you already have in your shop.

1. Circle-Cutting Jig



This is the *last* circle-cutting jig you'll ever need to make. (See photo at right.) It's easy to build, inexpensive, and can be set just as quickly as the rip fence on a table saw. The secret is the arm — it's an aluminum ruler that I picked up at a hardware store.

As you can see in the Exploded View on the opposite page, this jig consists of three main parts: a *base* for the router, an aluminum ruler that acts as a *pivot arm*, and an adjustable *pivot block* that determines the size of the circle.

▲ *Straight Bit. A straight bit is a great choice for the heavy-duty work of routing a circle from a workpiece.*

Base – I started on the jig by making the paddle-shaped base shown in the Base Layout drawing on the opposite page. When mounting the router, the idea is to center it about 6" from the end of the base. And this isn't hard to do. The router's base is a ready-made template for laying out the shape of the base and then marking and drilling the holes.

Blocks – After cutting the base to final shape, you can turn your attention to a pair of hardwood blocks. One block attaches to the base and allows you to mount the ruler. The other one will become the pivot block that's used to determine the size of the circle you cut.

Since both blocks are the same size (and small), cutting a groove down the center to accept the ruler could be a challenge. To do this safely, it's best to start with an extra-long workpiece. Just make sure the depth of the groove is slightly less ($^1/_{32}$") than the thickness of the ruler.

Once the groove is complete, you can cut two blocks from the blank. Then glue one block to the base flush with the back edge. (See Side View on opposite page.)

Pivot Block – To create the pivot block, the second block is glued to a $^1/_4$" hardboard *spacer*. The spacer raises the pivot block to match the height of the block on the base.

The next step is to drill three holes down the center of the pivot block. The outside holes are used to attach a hairline indicator (added later).

The center hole is for the pivot pin. This pin is just a cutoff bolt that's glued in place with epoxy.

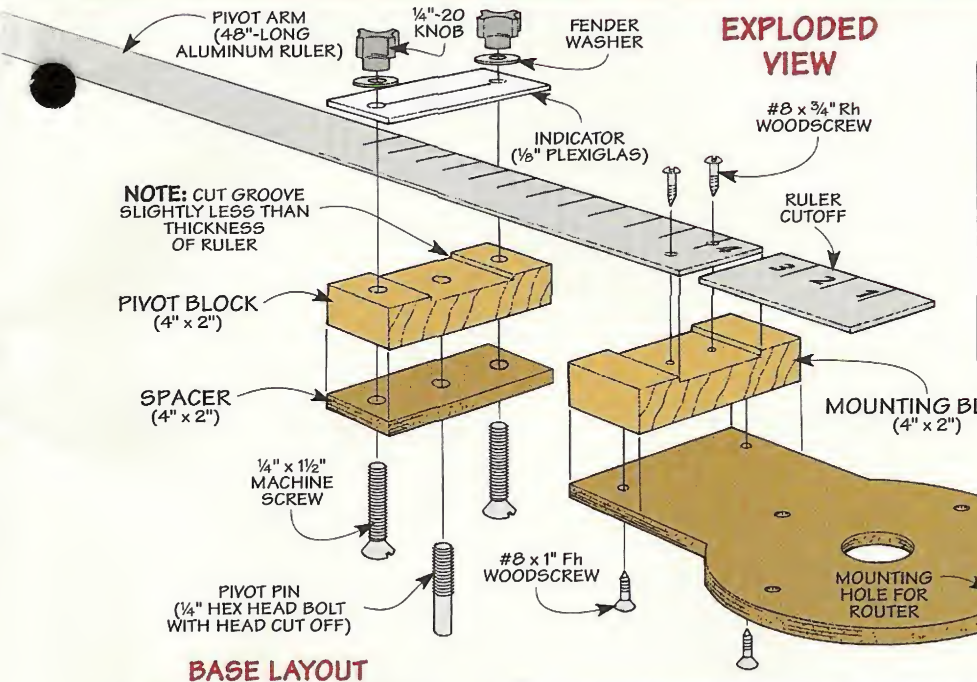
Indicator – The key to this jig is the hairline indicator that's added to the pivot block. This indicator accomplishes two things.

First, it allows you to lock the ruler securely to the pivot block. (See End View.) And second, you can accurately set the radius of the circle by aligning the hairline over the ruler. (See Top View.)

After cutting the indicator to size, drill a pair of holes to match the outside holes in the pivot block. Then scribe a hairline on the indicator so it lines up directly over the pivot pin.

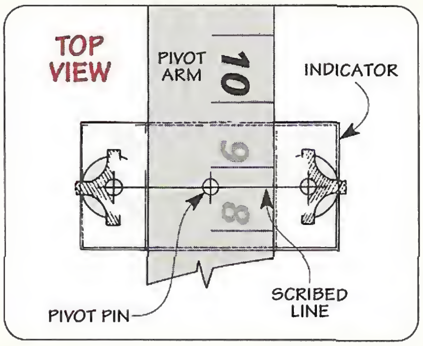
Assembly – Now you're ready to attach the ruler to the mounting block on the base. But first, you'll need to install the router bit you're going to use for cutting the circles. I like to use a $^1/_2$"-dia. straight bit (see margin) but the important thing is that you always use the *same* diameter bit.

EXPLODED VIEW

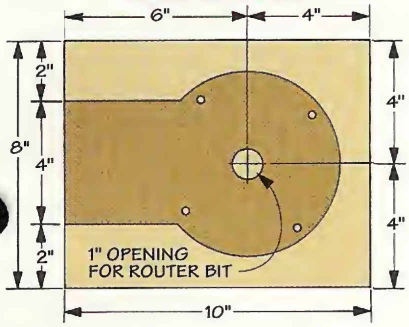

PIVOT ARM (48"-LONG ALUMINUM RULER)
¼"-20 KNOB
FENDER WASHER
INDICATOR (⅛" PLEXIGLAS)
#8 x ¾" Rh WOODSCREW
RULER CUTOFF
NOTE: CUT GROOVE SLIGHTLY LESS THAN THICKNESS OF RULER
PIVOT BLOCK (4" x 2")
SPACER (4" x 2")
MOUNTING BLOCK (4" x 2")
¼" x 1½" MACHINE SCREW
PIVOT PIN (¼" HEX HEAD BOLT WITH HEAD CUT OFF)
#8 x 1" Fh WOODSCREW
MOUNTING HOLE FOR ROUTER
BASE (SEE BASE LAYOUT FOR SIZING)

NOTE: PIVOT BLOCK AND MOUNTING BLOCK ARE MADE FROM ¾"-THICK STOCK; BASE AND SPACER ARE ¼" HARDBOARD

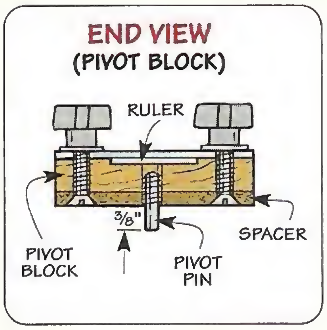
TOP VIEW


PIVOT ARM
INDICATOR
10
9
8
PIVOT PIN
SCRIBED LINE

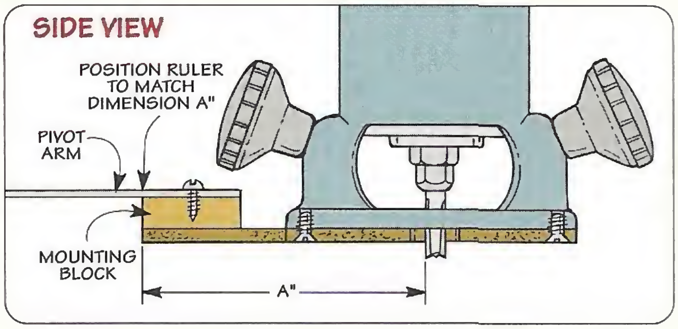
BASE LAYOUT


6"
4"
2"
8"
4"
2"
4"
4"
1" OPENING FOR ROUTER BIT
10"

END VIEW (PIVOT BLOCK)

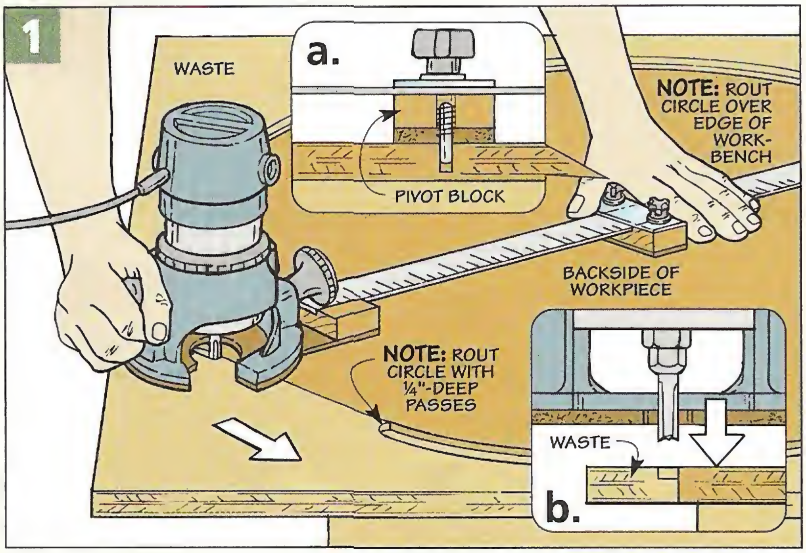

RULER
⅜"
SPACER
PIVOT BLOCK
PIVOT PIN

SIDE VIEW


POSITION RULER TO MATCH DIMENSION A"
PIVOT ARM
MOUNTING BLOCK
A"

Now to find out where to attach the ruler, measure from the cutting edge of the bit to the back edge of the base (Dimension A" in Side View.) (In my case, with a ½" bit, this was 5¾".)

To allow you to use the ruler to set the radius, position it so that dimension A" aligns with the back edge of the mounting block. Then screw the ruler in place. Note: The part of the ruler that sticks past the edge of the mounting block needs to be cut off.


1
WASTE
a.
PIVOT BLOCK
NOTE: ROUT CIRCLE OVER EDGE OF WORKBENCH
BACKSIDE OF WORKPIECE
NOTE: ROUT CIRCLE WITH ¼"-DEEP PASSES
WASTE
b.

Using the Jig – Now that you have the jig complete, you're ready to start routing circles. But you'll want to keep one thing in mind.

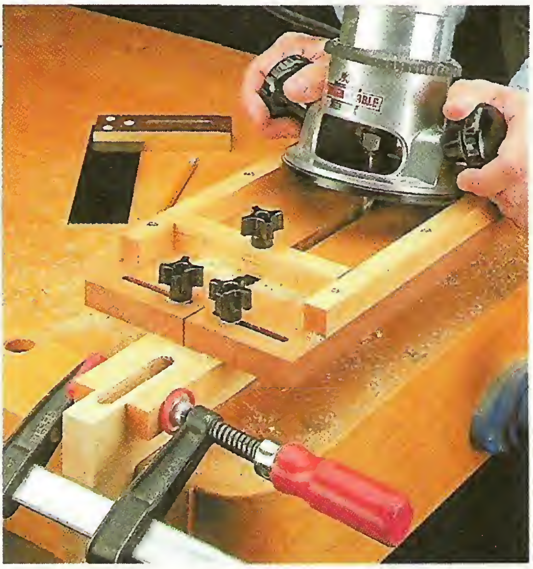
Since you need a shallow ¼"-dia. hole for the pivot pin, it's important to drill this hole in the *back* side of the workpiece (Figure 1a).

The next step is to slide the pivot block along the ruler and set it to match the desired radius of the circle you want to cut. Then lock the pivot block in place.

At this point you could set the router bit for a full depth cut. But I've found it's best to make a shallow (¼") pass and work my way through the workpiece in multiple passes.

Now, slip the pivot pin in the hole in the workpiece and raise the router off the workpiece. Then turn the router on and slowly lower it to the workpiece (Figure 1b). Finally, rout in a counterclockwise direction.

2. Mortising Jig



▲ *Spiral Upcut Bit. Cutting a smooth, clean mortise is easy with a spiral upcut bit. Plus, it pulls the chips out of the mortise as you work.*

▲ *Shining a small flashlight down through the router and platform makes it easy to align the router bit with the layout lines for the mortise.*

Drilling out a mortise on the drill press and cleaning it up with a chisel isn't a problem — except when you have a lot of them to do. Then the cleanup can be a real hassle. That's what makes the mortising jig shown at right so handy. Once the jig is set, you can use your router to knock out a lot of mortises in a matter of minutes — with no cleanup required. Note: This jig can be used with bits up to ½" in diameter (see margin) to cut mortises up to 3½" long.

The Jig – The jig is basically a "corral" for your router. The router rides on a *platform* with *guide strips* screwed to the top. (See drawing below.) As the router slides back and forth, the strips keep the router centered on the jig.

To define the ends of the mortise, there are two stops. A *fixed stop* is screwed to one end of the platform, while an *adjustable stop* is used to set the length of the mortise. A pair of *adjustable fences* make it easy to center the jig over the mortise. Then all you have to do is clamp the jig in place and rout.

Platform – To start on the jig, cut the platform 1½" wider than the base of your router. (My platform is sized for a 5¾"-dia. base.) Then to provide a way to attach the adjustable fences, cut a pair of slots at each end of the platform. To do this, drill a series of overlapping holes and then clean up the edges with a chisel.

At this point, you can turn your attention to the guide strips on the top of the platform. The important thing here is to position the strips so the base of the router will slide between them without any play.

So don't screw the guides down right away. Clamp them first and check the fit of the router by sliding it back and forth between the guides. Once you have a good fit, screw the guides strips in place.

Rout Slot – The next step is to create a slot down the center of the platform for the router bit. This is easy to do with the guide strips in place. I simply used my router and a ½" bit to cut a nice, clean slot. After completing the slot, the fixed stop can be screwed in place.

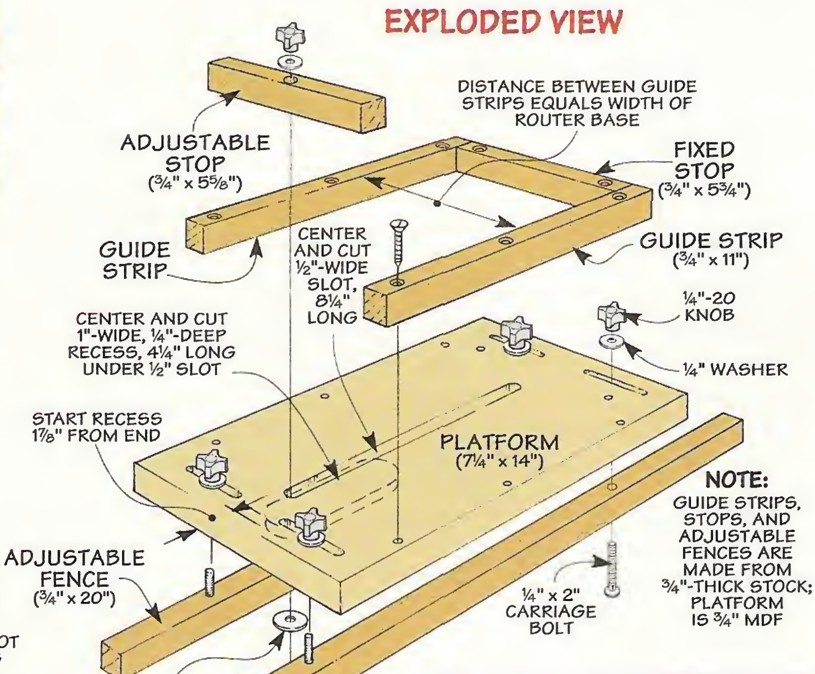
Recess – Before adding the adjustable stop, you'll need to cut a recess in the bottom of the platform. This recess provides clearance for the machine screw and washer that hold the adjustable stop in place. (See detail 'a.') Here again, I simply cut a series of shallow overlapping holes and then cleaned up the edges with a chisel.

To complete the jig, cut the adjustable fences to size and drill a pair of mounting holes at each end to line up with the slots in the platform.

Now you're ready to rout a mortise. After laying out the mortise on the workpiece, using the jig is a simple three-step process.

Set Fences – The first step is to set the jig in place and then position the adjustable fences to center the jig over the mortise using the center-

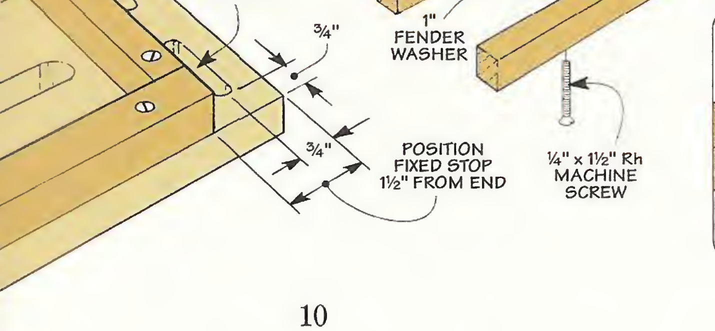
EXPLODED VIEW



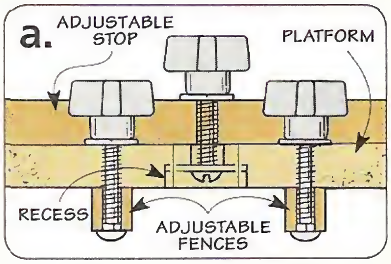
ADJUSTABLE STOP (¾" x 5⅝")
DISTANCE BETWEEN GUIDE STRIPS EQUALS WIDTH OF ROUTER BASE
FIXED STOP (¾" x 5¾")
GUIDE STRIP
CENTER AND CUT ½"-WIDE SLOT, 8¼" LONG
GUIDE STRIP (¾" x 11")
¼"-20 KNOB
CENTER AND CUT 1"-WIDE, ¼"-DEEP RECESS, 4¼" LONG UNDER ½" SLOT
¼" WASHER
START RECESS 1⅞" FROM END
PLATFORM (7¼" x 14")
ADJUSTABLE FENCE (¾" x 20")
¼" x 2" CARRIAGE BOLT
1" FENDER WASHER
¼" x 1½" Rh MACHINE SCREW

NOTE: GUIDE STRIPS, STOPS, AND ADJUSTABLE FENCES ARE MADE FROM ¾"-THICK STOCK; PLATFORM IS ¾" MDF

CORNER DETAIL



CUT ¼"-WIDE SLOT 2½" LONG
¾"
¾"
POSITION FIXED STOP 1½" FROM END



a.
ADJUSTABLE STOP
PLATFORM
RECESS
ADJUSTABLE FENCES

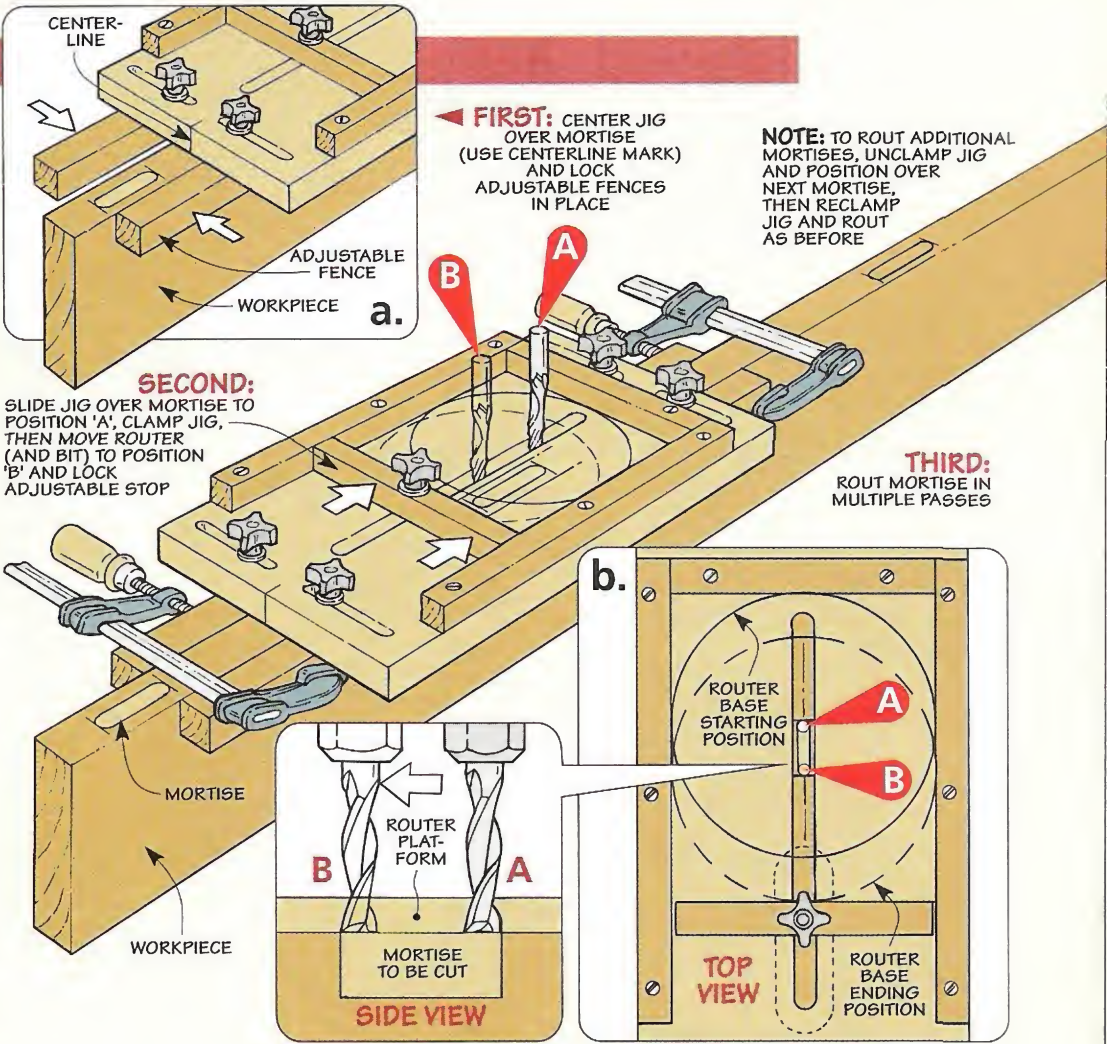
line mark shown in detail 'a' at right. Once that's complete, you can lock the fences in place.

Position Stops – Now set the router on the platform against the fixed stop. Then slide the jig along the workpiece until the outside edge of the router bit is aligned with the end of the mortise. (See margin on opposite page, and position A in detail 'b' and Side View.) Then clamp the jig to the workpiece.

To set the adjustable stop, slide the router along the platform and align the bit with the opposite end of the mortise, shown as position B in detail 'b' and Side View. Then lock the stop against the base of the router.

Rout Mortise – At this point, you're ready to rout the mortise. To do this, adjust the bit for a shallow (¼") cut. Here again, you'll need to tilt the router as you lower the bit into the workpiece.

Then slide the router along the jig until it contacts the adjustable stop. Completing the mortise is just a matter of resetting the bit for a slightly deeper cut and repeating the process.


CENTER-LINE
ADJUSTABLE FENCE
WORKPIECE
a.
FIRST: CENTER JIG OVER MORTISE (USE CENTERLINE MARK) AND LOCK ADJUSTABLE FENCES IN PLACE
NOTE: TO ROUT ADDITIONAL MORTISES, UNCLAMP JIG AND POSITION OVER NEXT MORTISE, THEN RECLAMP JIG AND ROUT AS BEFORE
B
A
SECOND: SLIDE JIG OVER MORTISE TO POSITION 'A', CLAMP JIG, THEN MOVE ROUTER (AND BIT) TO POSITION 'B' AND LOCK ADJUSTABLE STOP
THIRD: ROUT MORTISE IN MULTIPLE PASSES
MORTISE
WORKPIECE
b.
ROUTER BASE STARTING POSITION
A
B
ROUTER PLAT-FORM
B
A
MORTISE TO BE CUT
SIDE VIEW
TOP VIEW
ROUTER BASE ENDING POSITION

3. Edge Guide

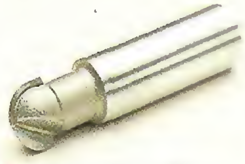
When using a hand-held router, an edge guide is great for routing dadoes, grooves, or decorative profiles near the edge of a piece. Although most router manufacturers offer an edge guide as an accessory, it's no trouble at all to build your own.

As you can see in the photo and drawing below, the edge guide consists of two parts: an *auxiliary base* with an adjustable *fence.*

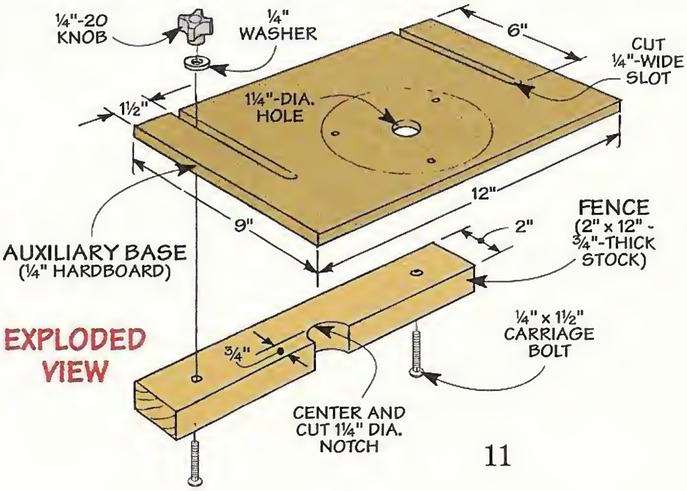
Base – The base is nothing more than a piece of ¼" hardboard, and its size isn't all that important. I made mine big enough to give me "solid" support, but not so big as to be cumbersome to use easily.

In the center of the base, you'll need clearance for the router bit. And the larger the hole, the easier it'll be to see what you're routing. (I drilled a 1¼"-dia hole.) Finally, two slots are cut to hold the fence and allow it to be adjusted easily.

Fence – When making the fence, what you want is a straight, smooth edge to slide against the workpiece. (I used hard maple.) Here again, to provide clearance for the bit, cut a centered notch in the fence. Finally, attach the fence to the base with a pair of carriage bolts, washers, and plastic knobs.

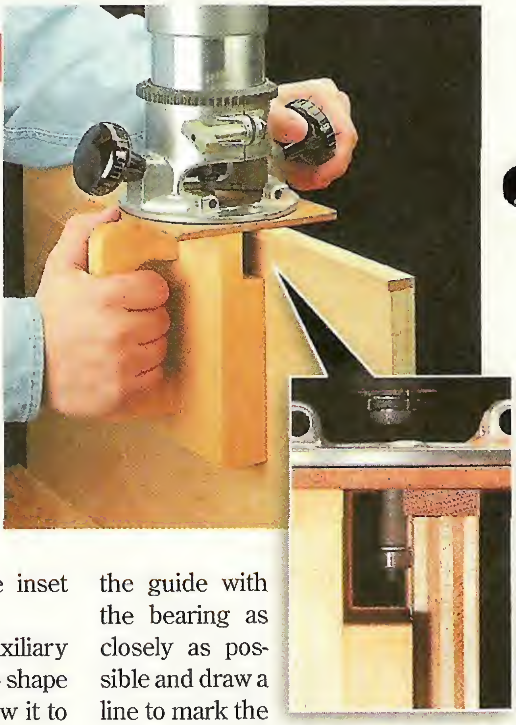


▲ *Decorative Bits. Like the core box bit above, a decorative bit can be used with an edge guide to increase a router's potential.*


¼"-20 KNOB
¼" WASHER
6"
CUT ¼"-WIDE SLOT
1½"
1¼"-DIA. HOLE
12"
9"
2"
FENCE (2" x 12" - ¾"-THICK STOCK)
AUXILIARY BASE (¼" HARDBOARD)
EXPLODED VIEW
¾"
¼" x 1½" CARRIAGE BOLT
CENTER AND CUT 1¼" DIA. NOTCH

4. Flush Trim Jig

▲ *Flush Trim Bit. A flush trim bit makes it a snap to trim edging perfectly even with a piece of plywood.*



A hand-held router and a flush trim bit will make quick work of trimming the hardwood edging flush on a plywood panel — if you can keep the router steady. The problem is the edge of a panel just isn't much to balance the router on. This makes it very easy to tip the router and gouge the wood.

But with the flush trim jig shown in the photo at right, trimming the edging flush is almost automatic. After clamping the workpiece in a bench vise, you simply run the router along the edge — without feeling like a tightrope walker.

The Jig – As you can see in Figure 1, the router is attached to an *auxiliary base* that replaces the standard base on the router. Adding a vertical *guide* and *guide support* stabilizes the router and keeps the bit perpendicular to the edging at the same time. A *handle* attached to the jig provides solid control.

To make the auxiliary base, I used my existing router base as a template for marking the mounting holes. It's a good idea to drill and counterbore these holes a little oversize (Figure 1a). This way, you can shift the router on the base when you need to "fine tune" the jig later on.

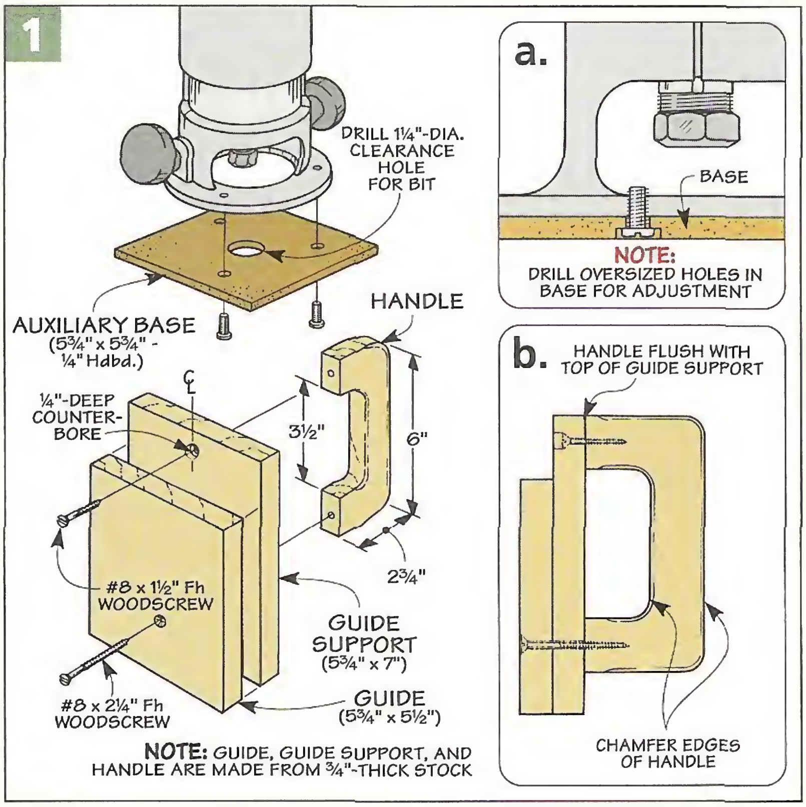
Both the guide and the guide support are the same width. But the guide is 1½" *shorter* than the support. This way, as you glue the two parts together, it forms a "step" for bit clearance, as you can see in the inset photo at right.

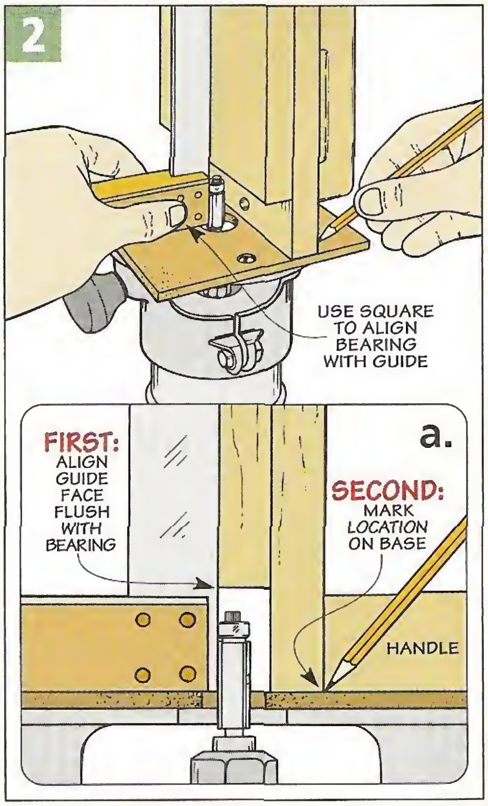
Before attaching the auxiliary base, you can cut the handle to shape from ¾"-thick stock and screw it to the guide support (Figure 1b).

Assembly – When attaching the guides to the auxiliary base, it's important to align the inside face of the guide with the bearing on the bit. This way, the guide can do its job of stabilizing the router and the bit can do its job of trimming the edging flush.

To do this, mount the router to the base and set the guide assembly in place. Then use a square to align the guide with the bearing as closely as possible and draw a line to mark the location (Figures 2 and 2a).

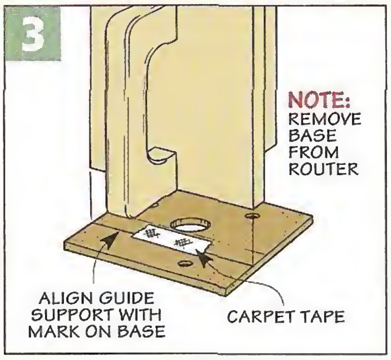
After removing the router from the base, you'll need to turn the jig over to drill the pilot holes for the screws. To help keep the base from shifting out of place as you do this, attach a piece of carpet tape to the base. Then use the pencil mark on the base to realign the guide (Figure 3). Finally, remove the carpet tape and attach the guide to the base (Figure 4).

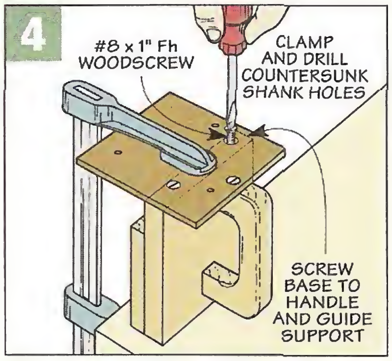

1
DRILL 1¼"-DIA. CLEARANCE HOLE FOR BIT
AUXILIARY BASE (5¾" x 5¾" - ¼" Hdbd.)
HANDLE
¼"-DEEP COUNTER-BORE
℄
3½"
6"
2¾"
#8 x 1½" Fh WOODSCREW
GUIDE SUPPORT (5¾" x 7")
#8 x 2¼" Fh WOODSCREW
GUIDE (5¾" x 5½")
NOTE: GUIDE, GUIDE SUPPORT, AND HANDLE ARE MADE FROM ¾"-THICK STOCK
a.
BASE
NOTE: DRILL OVERSIZED HOLES IN BASE FOR ADJUSTMENT
b.
HANDLE FLUSH WITH TOP OF GUIDE SUPPORT
CHAMFER EDGES OF HANDLE


2
USE SQUARE TO ALIGN BEARING WITH GUIDE
a.
FIRST: ALIGN GUIDE FACE FLUSH WITH BEARING
SECOND: MARK LOCATION ON BASE
HANDLE

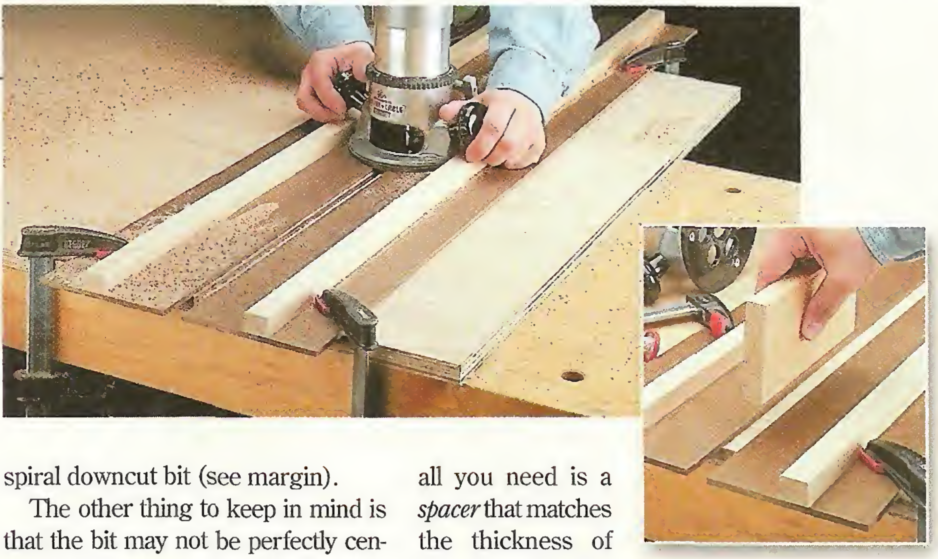
Test Cut – After screwing the router back on the base, it's a good idea to make a test cut on some edging attached to a scrap piece. Simply run the router along the face of the scrap and check the results.

If the edging isn't trimmed flush with the plywood, you'll need to adjust the position of the router. To do this, loosen the mounting screws and shift the router as needed.


3
NOTE: REMOVE BASE FROM ROUTER
ALIGN GUIDE SUPPORT WITH MARK ON BASE
CARPET TAPE


4
#8 x 1" Fh WOODSCREW
CLAMP AND DRILL COUNTERSUNK SHANK HOLES
SCREW BASE TO HANDLE AND GUIDE SUPPORT

5. Dado Jig



When cutting a dado, I typically use the table saw. But sometimes, the *panel is just too large too handle.* In that case, it's best to clamp the panel to a bench and *rout* the dado.

To produce straight, accurate cuts, I use a hand-held router and a pair of guides like the ones shown at right. These guides allow you to cut a dado with perfectly straight edges. In addition, the piece that goes into the dado will fit precisely.

Guides – Each guide consists of two parts: a hardboard *base* that the router rides on and a wood *fence* to guide it (Figure 1). Note: I made my guides 50" long so I could rout across *the full width of a sheet of plywood.*

Also, it's best to start with an extra-wide base. This way, once the fence is glued in place, you can trim the base to match your router perfectly. This creates a reference edge for aligning the guide during use. But there are two things to keep in mind.

First, you'll want to use the same router bit you plan to use when cutting the dadoes. I like to use a ½" spiral downcut bit (see margin).

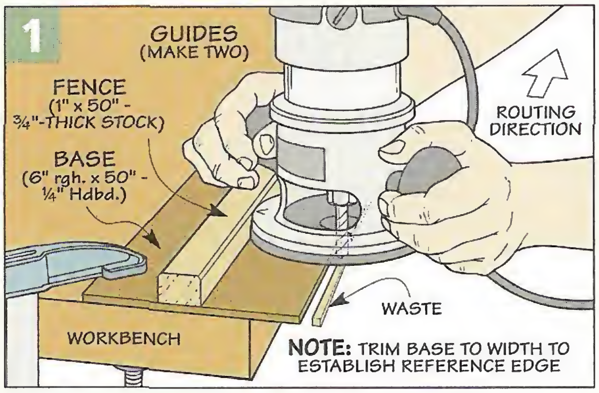
The other thing to keep in mind is that the bit may not be perfectly centered in the router base. So be sure that the same side of the router base is against the fence when you trim each *guide to width. (I make a reference* mark on my router base.)

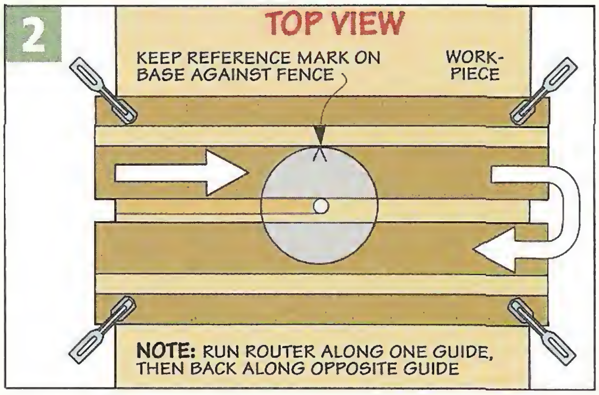
Setup – Once the guides are complete, positioning them on the workpiece only takes a second. Start by laying out the location of one side of the dado. Then align one of the guides along that mark and clamp it in place (Figure 2).

Positioning the second guide is even easier. Instead of a layout line, all you need is a *spacer* that matches the thickness of the piece that fits in the dado. After "sandwiching" the spacer between the guides, clamp *the second guide* in place and then remove the spacer. (See inset above.)

Rout Dado – At this point, routing the dado is just a matter of making a series of shallow (⅛") passes. To define one side of the dado, run the router along the fence of the first guide (Figure 2). Then with the reference mark against the second fence, run the router down the second guide for a perfect fit. ▲

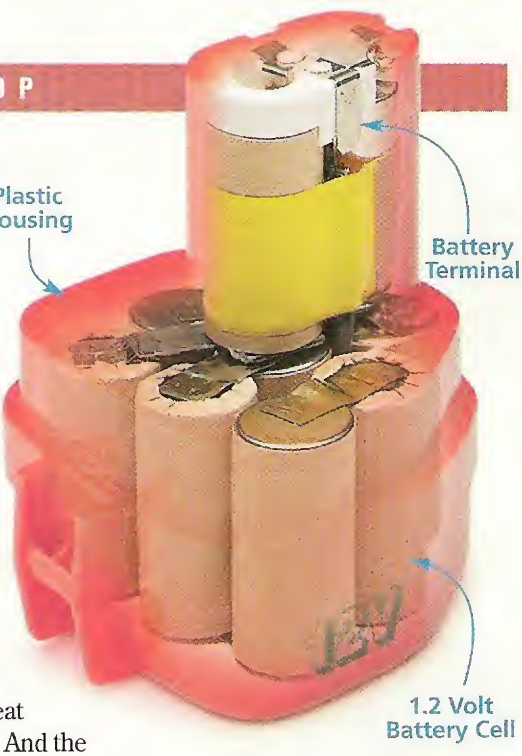
▲ *Spiral Downcut Bit. To get smooth cuts in plywood without "lifting" the veneer, try using a spiral downcut bit.*

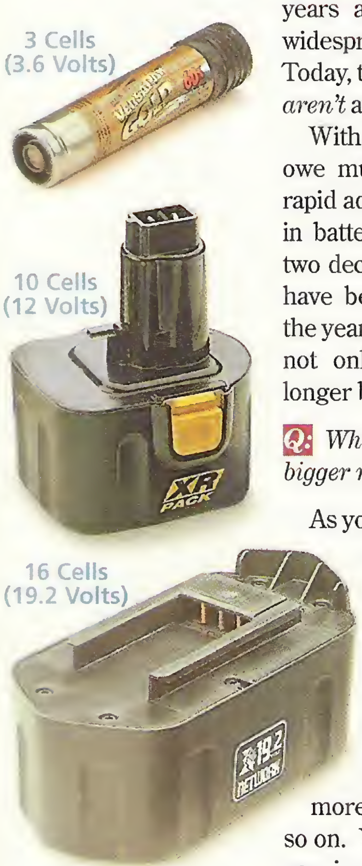

1
GUIDES (MAKE TWO)
FENCE (1" x 50" - ¾"-THICK STOCK)
BASE (6" rgh. x 50" - ¼" Hdbd.)
ROUTING DIRECTION
WASTE
WORKBENCH
NOTE: TRIM BASE TO WIDTH TO ESTABLISH REFERENCE EDGE


2
TOP VIEW
KEEP REFERENCE MARK ON BASE AGAINST FENCE
WORK-PIECE
NOTE: RUN ROUTER ALONG ONE GUIDE, THEN BACK ALONG OPPOSITE GUIDE

Cordless Tool Batteries

Here are the answers to some commonly-asked questions about cordless tool batteries.





▲ Battery Types. *Cordless tool batteries come in a variety of shapes and sizes, depending on the configuration of the cells inside.*

When cordless tools first came onto the scene about twenty years ago, no one imagined how widespread their use would become. Today, there are few power tools that *aren't* available in a cordless version.

Without question, cordless tools owe much of their success to the rapid advances that have been made in battery technology over the last two decades. Cordless tool batteries have been steadily improving over the years so that today's batteries are not only more powerful but run longer between charges.

Q: *When it comes to voltage, is bigger necessarily better?*

As you can see in the photo above, cordless tool batteries are made up of individual battery "cells." Each cell is capable of delivering 1.2 volts. So a 9.6-volt battery contains eight cells. Add two more cells and you jump to 12 volts. A couple more and you have 14.4 volts, and so on. With each step up in voltage, you increase the amount of power available for the tool.

But there's a downside to this. Most obvious is the fact that with each jump in voltage, the battery pack also increases in size and weight. When you get up to the 18 volt and larger batteries, it's almost like lugging around a bowling ball.

Along with the increase in power comes an increase in price, both upfront and in the long run. You can expect to pay more for a higher voltage battery. And as a general rule, the higher the voltage, the shorter the life of the battery (the number of times it can be re-charged). Here's why. Heat is a battery's natural enemy. And the cells create heat during use. With the higher voltage batteries, the cells are packed into the case like sardines in a can. The more cells there are the more difficult it is for the battery pack to dissipate the heat, thereby shortening the battery life.

So how much voltage do you really need? A lot of it depends on the tool and how you'll be using it. For a cordless drill, I think a 12 or 14.4-volt battery offers plenty of power and isn't too cumbersome to carry around and use all day.

But for a larger tool like a circular saw or a hammer drill, the higher voltage batteries (18 or more volts) may be a better bet. These power-hungry tools generally require more voltage.

Nickel-Metal Hydride
Nickel-Cadmium
Ni-MH
12V
2.2Ah
12V

▲ Ni-MH vs. Ni-Cd. *Other than the label, there isn't any real difference in the outward appearance of the two types of batteries.*

Q: *Will a higher voltage battery run longer between charges than a lower voltage battery?*

Yes and no. The running time of a battery is measured not in terms of volts but by "amp-hours." Most batteries will have an amp-hour rating printed right on them (generally ranging from 1.3 to 3.0). The higher the amp-hour rating, the longer the battery will run between charges.

But generally speaking the larger voltage batteries have higher amp-hour ratings. So even though there isn't a direct correlation, the higher voltage batteries often have a longer run time.

Q: *What's the difference between Ni-MH and Ni-Cd batteries?*

In the world of cordless power tools, nickel-cadmium (Ni-Cd) batteries are the old standby. But about three or four years ago, a couple of tool manufacturers began introducing cordless tools that used nickel-metal hydride (Ni-MH) batteries. Other than the label, these batteries look just like the old Ni-Cd batteries. So why the switch?

First is the quest for more power and longer running times. Although great strides have been made in battery technology, it appears that scientists have hit the wall in terms of expanding the amp-hour capacity of

Ni-Cd batteries. It seems unlikely that Ni-Cd batteries will go beyond 2.2 amp-hours. On the other hand, Ni-MH batteries have a greater potential for increased amp-hour capacity. In fact, there are currently some Ni-MH batteries on the market that boast a 3.0 amp-hour rating. This increase means that the battery can run longer between charges, which is a big plus.

The second reason has to do with the environment. Cadmium is considered a hazardous waste — like lead or mercury. So disposal of Ni-Cd batteries is a problem. If thrown into a landfill, the cadmium eventually leaks out of the battery and finds its way into the groundwater. Several European countries are moving towards a ban on Ni-Cd batteries, making Ni-MH batteries the logical alternative. Here in the United States, a battery recycling program has been instituted in order to keep worn-out Ni-Cd batteries from being tossed in landfills.

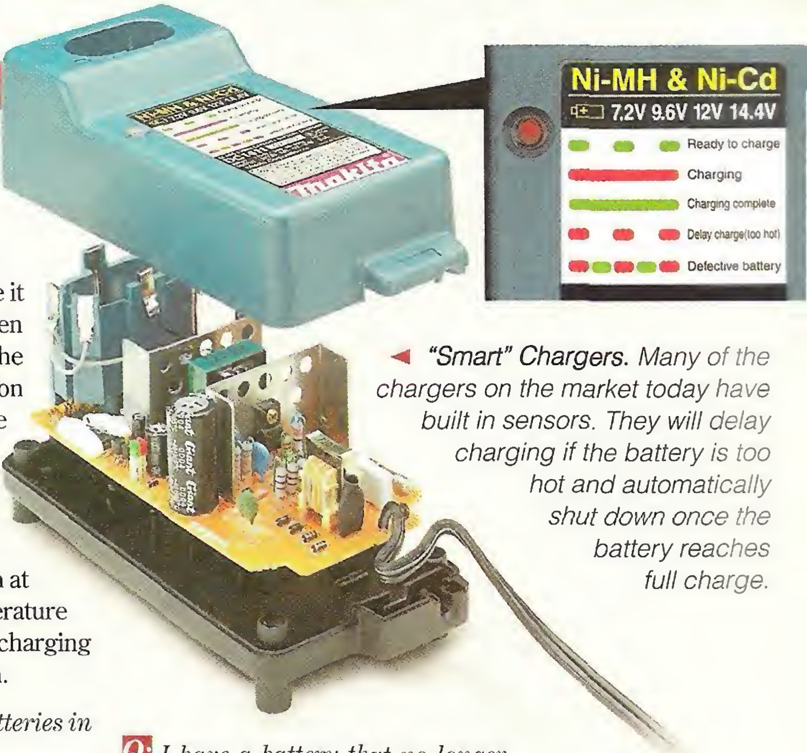
But you don't have to worry if you currently have a cordless tool that uses Ni-Cd batteries. Manufacturers don't have any immediate plans to do away with Ni-Cd batteries. And the Ni-MH batteries will still work with your old cordless tools. (You may need to purchase a new battery charger that is capable of charging both types of batteries.)

Ni-MH batteries cost more than Ni-Cd batteries. And you won't be able to get as many charges out of a Ni-MH battery as you would a comparable Ni-Cd battery. But on the other hand, Ni-MH batteries run longer on each charge, so in the end the useable life of the battery is about the same.

Q: *Should I let my batteries run down completely before charging them up again?*

You may have heard that recharging a battery that hasn't been completely drained will cause it to develop a "memory" and eventually the run time of the battery will be shortened. This is really just a myth. There is no need to completely drain a battery before recharging it.

I typically leave my battery on the tool until I notice it starting to lose power. Then it's time to pop it into the charger. One word of caution however. To maximize the life of your battery, you should let it cool down to room temperature before recharging it. Battery chargers like the one shown at right have built in temperature sensors so they won't start charging until the battery cools down.



◄ "Smart" Chargers. Many of the chargers on the market today have built in sensors. They will delay charging if the battery is too hot and automatically shut down once the battery reaches full charge.

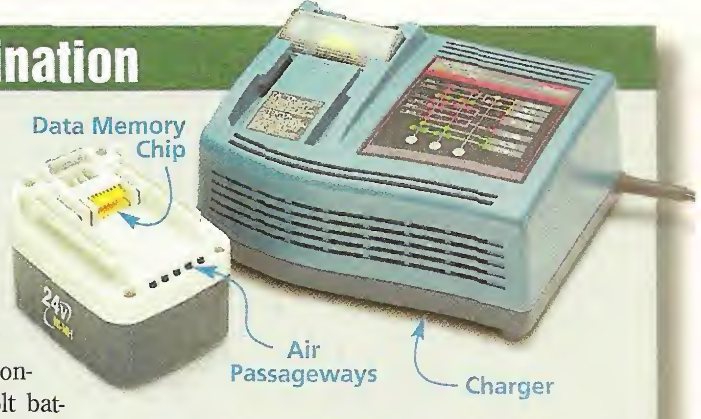
Q: *Is it safe to leave my batteries in the charger?*

That depends on your charger. Many (but not all) of the newer chargers sense when a battery has reached full charge and shut down automatically, or go into a "trickle charge" mode to prevent overcharging. Some manufacturers of these "smart" chargers claim that it won't harm the battery to leave it in the charger for days. But to be on the safe side, I prefer to unplug the charger before I leave the shop.

Q: *I have a battery that no longer takes a charge. Can it be repaired?*

Battery packs that have reached the end of their useful life can usually be serviced by a battery specialist. Basically, the individual cells are replaced with new ones. But unless you have a battery pack that's obsolete, it's generally less expensive to simply buy a new battery and recycle your old one. To locate a battery recycling drop-off point near you, call 1-800-8-BATTERY.

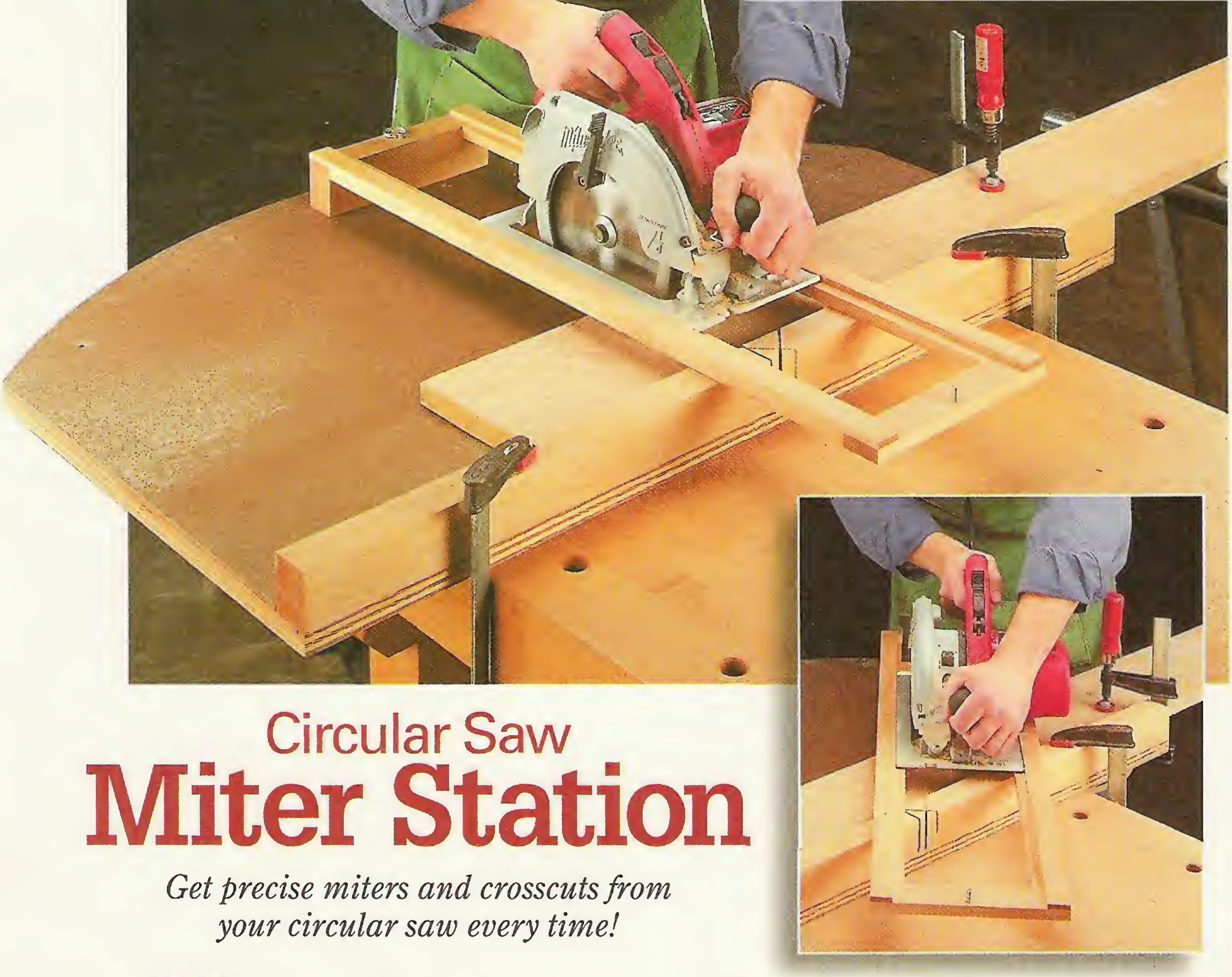
High-Tech Combination



Along with advancements in batteries have come improvements in battery charging technology. Recently, Makita introduced a new charger that goes a step further than the "smart" charger shown above. Called the Makstar system, this charger works in conjunction with Makita's new 24-volt batteries (see photo at right). The battery has a data memory chip that records the "life history" of each cell. When the battery is placed on the charger, a mini-computer inside the charger reads this information and selects the optimal charging route for maximum battery life. A display on the charger indicates the condition of the battery and lets you know the progress during the charging process.

In addition, the charger has a small, built-in fan that blows air through a series of passageways inside the battery. This helps to keep the battery cool during the charging process, thereby extending the life of the battery.

The Makstar charger comes standard with all of Makita's 24-volt cordless tools. And by purchasing a separate adapter plate, the Makstar charger can be used to charge all other Makita batteries, from 7.2 to 18 volts, both Ni-Cd and Ni-MH.



Circular Saw
Miter Station

Get precise miters and crosscuts from your circular saw every time!

When was the last time you used a portable circular saw to cut a perfect miter or make an exact 90° crosscut? For me, the answer is almost never — that is, until I built this miter station (see photo above).

To ensure accurate results, this station automatically positions the saw at 45° or 90° to the edge of a board. Even more important, it has a built-in guide that keeps you cutting in a straight line.

Platform and Carriage – This project consists of two parts. The first is a platform with a fence that's used to position a board under the saw. The other part is a long, open frame that forms a carriage which guides the saw. To get the carriage to the desired angle, it pivots on a steel pin that fits into the fence (see inset photo).

▲ *Index Pin. A metal pin locks the saw carriage in place for precise cuts every time.*

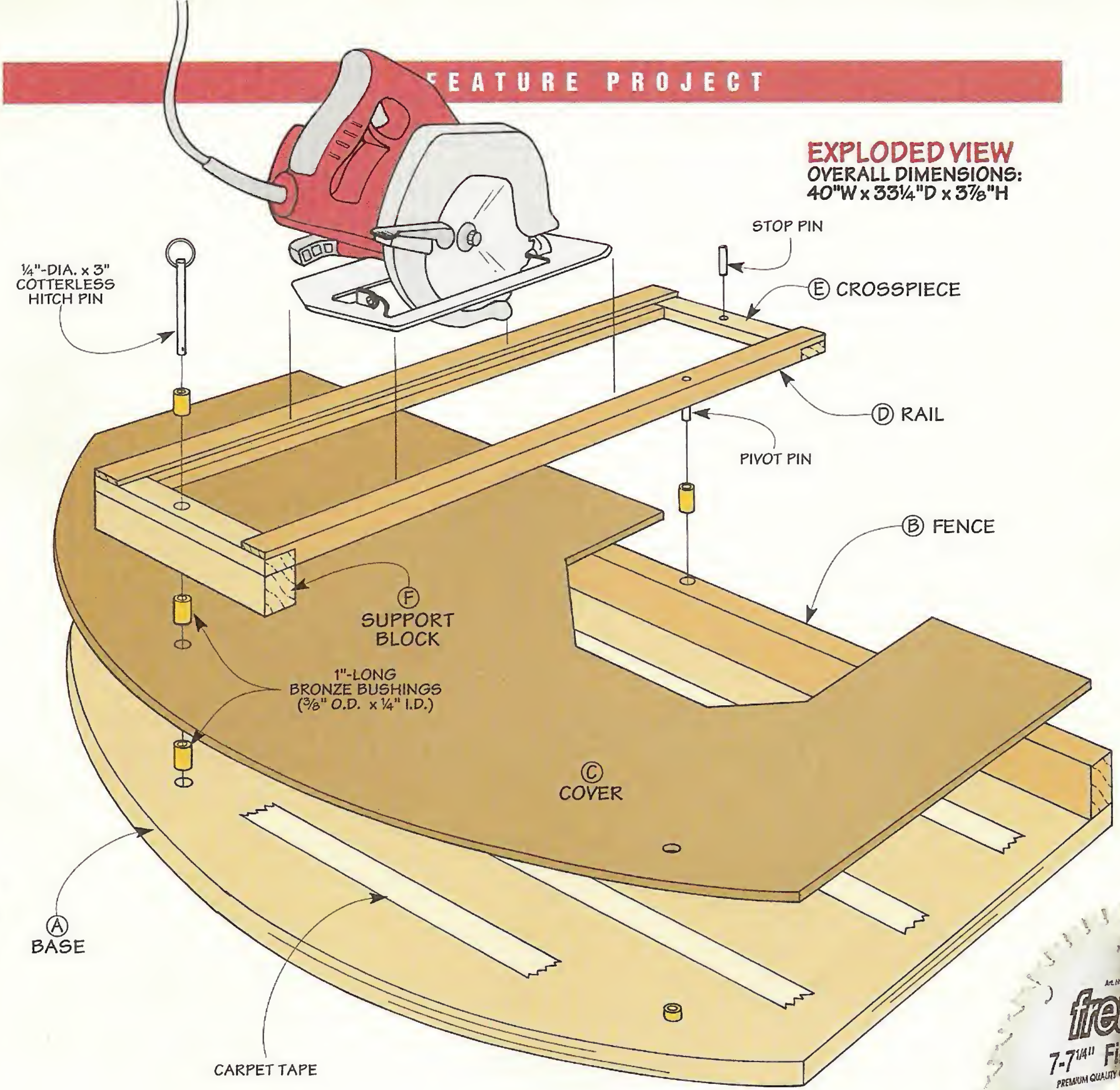
▲ *Stop Pin. At the end of a cut, the saw is stopped by a pin in the carriage.*

Indexing System – One great feature of this project is how easily you can set up to make a cut at a 90° or 45° angle. A simple indexing system locks the carriage in exactly the right place. Just pivot the carriage into position and push an index pin through the carriage until it drops into a hole in the platform (see left photo below). Bronze bushings line each hole to keep the holes from wearing with use.

The stops make it quick and easy to cut the most common angles. But you can cut any angle between 45° and 90° by just positioning the carriage where you need it and clamping it in place.

Stop – At the end of a cut, the saw's travel is stopped by a metal pin that sticks up at the end of the carriage (right photo). This keeps you from pushing the saw too far and having the back end of the carriage flip up. When the saw hits the stop, the cut is done.

Replaceable Top – The top of the platform is a piece of hardboard that can be removed and replaced if it begins to wear. It's held down with double-sided carpet tape so that it stays put while the station is being used (see the photo on page 21).



EXPLODED VIEW
OVERALL DIMENSIONS:
40"W x 33¼"D x 3⅞"H
STOP PIN
Ⓔ CROSSPIECE
¼"-DIA. x 3" COTTERLESS HITCH PIN
Ⓓ RAIL
PIVOT PIN
Ⓑ FENCE
Ⓕ SUPPORT BLOCK
1"-LONG BRONZE BUSHINGS (⅜" O.D. x ¼" I.D.)
Ⓒ COVER
Ⓐ BASE
CARPET TAPE

Materials

Platform	
A Base (1)	*28 x 40 - ¾ Ply.*
B Fence (1)	*1½ x 1⅞ - 40*
C Cover (1)	*26½ x 40 - ¼ Hdbd.*
Saw Carriage	
D Rails (2)	*¾ x 1½ - 32*
E Crosspcs. (2)	*½ x 1½ - 8⅝ (rgh.)*
F Sprt. Blk. (1)	*1½ x 1⅝ - 8⅝ (rgh.)*

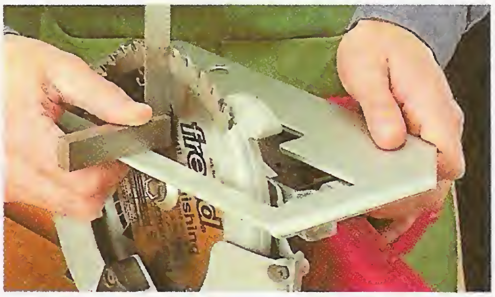
Hardware

- *(2) ¼" x 2½" Hex Head Bolts*
- *(6) ⅜" O.D. x ¼" I.D. - 1" Bronze Bushings*
- *(1) ¼"-dia. x 3" Cotterless Hitch Pin*

Saw Tune-up

freud
7-7¼" Finishing
PREMIUM QUALITY CARBIDE BLADE
5/8" BORE
LASER CUT
40 TEETH
THIN KERF
ADVANCED ANTI-KICKBACK DESIGN

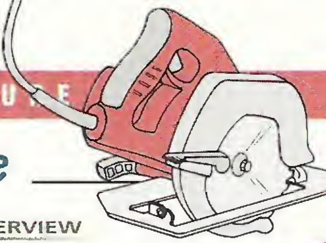
Building this miter station does wonders for improving the accuracy of the crosscuts and miters you can make with your circular saw. But there are a couple of other things you can do that will improve the final fit and finish of the cut surface.



In addition to cutting an angle accurately, it's just as important that the cut be as clean as possible. For a cut with a satin-smooth surface, choose a high-quality crosscut blade.

I found a 40-tooth, carbide-tipped blade at a local home center (see photo above). It was pricier than any other blade I've bought for my circular saw (about $22), but judging by the quality of the cuts, it was well worth it.

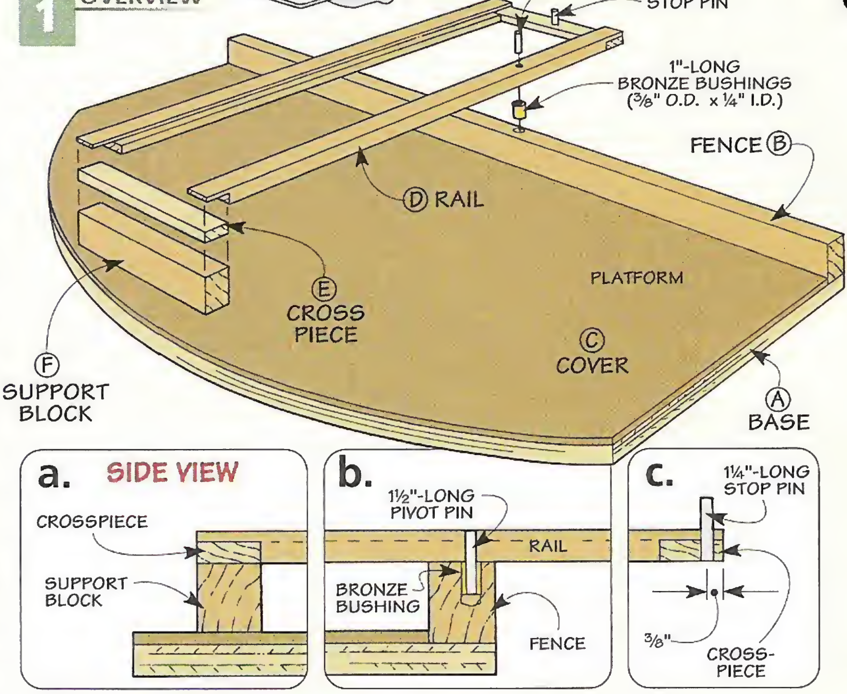
Once the blade is installed, make sure the base of the saw is perfectly square to the blade, as shown in the photo at left. When you do this, make sure you set the blade of the square against the body of the saw blade, and not against a tooth.



Platform & Carriage

▲ ***Installing Bronze Bushings.*** *To get a bushing into a hole without damaging the bushing, I press it in with a C-clamp.*

1 OVERVIEW


PIVOT PIN
STOP PIN
1"-LONG BRONZE BUSHINGS (3/8" O.D. x 1/4" I.D.)
FENCE Ⓑ
Ⓓ RAIL
Ⓔ CROSS PIECE
PLATFORM
Ⓒ COVER
Ⓕ SUPPORT BLOCK
Ⓐ BASE
a. SIDE VIEW
CROSSPIECE
SUPPORT BLOCK
b.
1½"-LONG PIVOT PIN
RAIL
BRONZE BUSHING
FENCE
c.
1¼"-LONG STOP PIN
3/8"
CROSS-PIECE

The platform of the circular saw miter station provides a flat, stable surface with a fence for aligning the workpiece. It also supports the carriage that the saw rides on.

Base – The platform starts out with a rectangular *base (A)* made of 3/4" plywood (Figure 2).

Fence – Next, a hardwood fence is added along one edge of the base. The fence aligns the workpiece on the platform and supports one end of the carriage. The *fence (B)* is cut to the same length as the base. I cut mine from 1½"-thick stock, but it could also be made from two pieces of 3/4" stock glued together.

Later, after the carriage is built, the carriage is attached to the fence by a short steel pin that fits into a bushing in the fence. So after the fence is glued in place, a hole is drilled for the bushing.

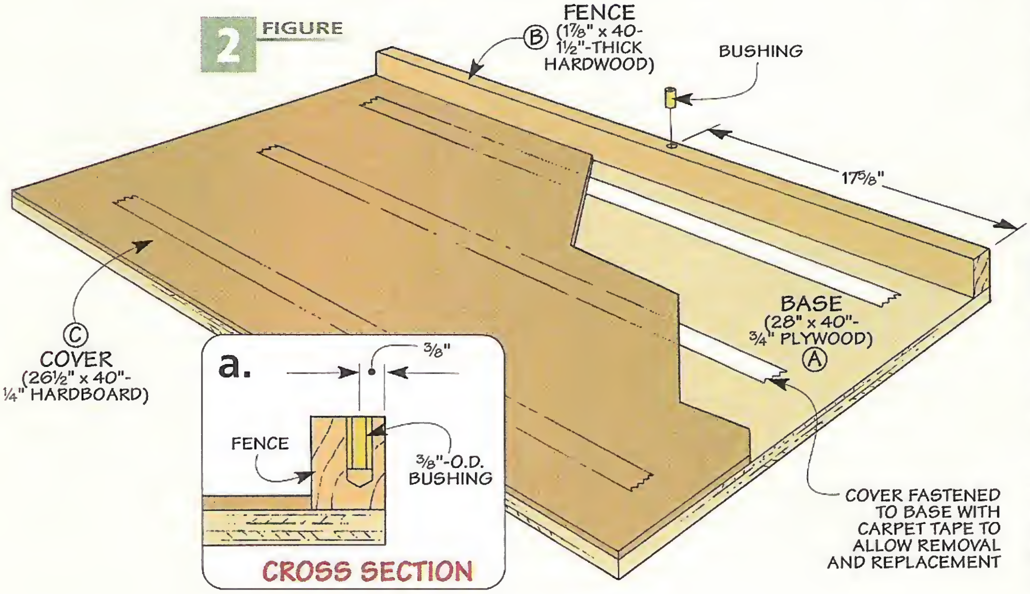
If you take a look at Figure 2, you'll see this hole is 17⅝" from one end of the fence — which end depends on your saw. If your circular saw's blade is on the right side of the saw (like mine), measure from the right end of the fence. If the blade is on the left side of the saw, measure from the left end of the fence.

Once the hole is drilled, a bronze bushing is pressed into it. This bushing prevents the pivot pin from enlarging the hole. Driving the bushing in with a hammer could damage the bushing's top edge. As you can see in the margin, the solution is to use a C-clamp.

Cover – To complete the platform, a hardboard *cover (C)* is added to the base. The cover is the same length as the base, but it's 1½" narrower to allow for the fence.

The cover is meant to be replaced when it gets chewed up. For this reason, it's held down only with double-sided carpet tape, as you can see in Figure 2. When the cover is in place, the ends can be sanded flush with the base. Don't worry about sanding the front edge, as it will be cut to shape later.

2 FIGURE


FENCE Ⓑ (1⅞" x 40-1½"-THICK HARDWOOD)
BUSHING
17⅝"
Ⓒ COVER (26½" x 40"-¼" HARDBOARD)
BASE (28" x 40"-3/4" PLYWOOD) Ⓐ
COVER FASTENED TO BASE WITH CARPET TAPE TO ALLOW REMOVAL AND REPLACEMENT
a.
3/8"
FENCE
3/8"-O.D. BUSHING
CROSS SECTION

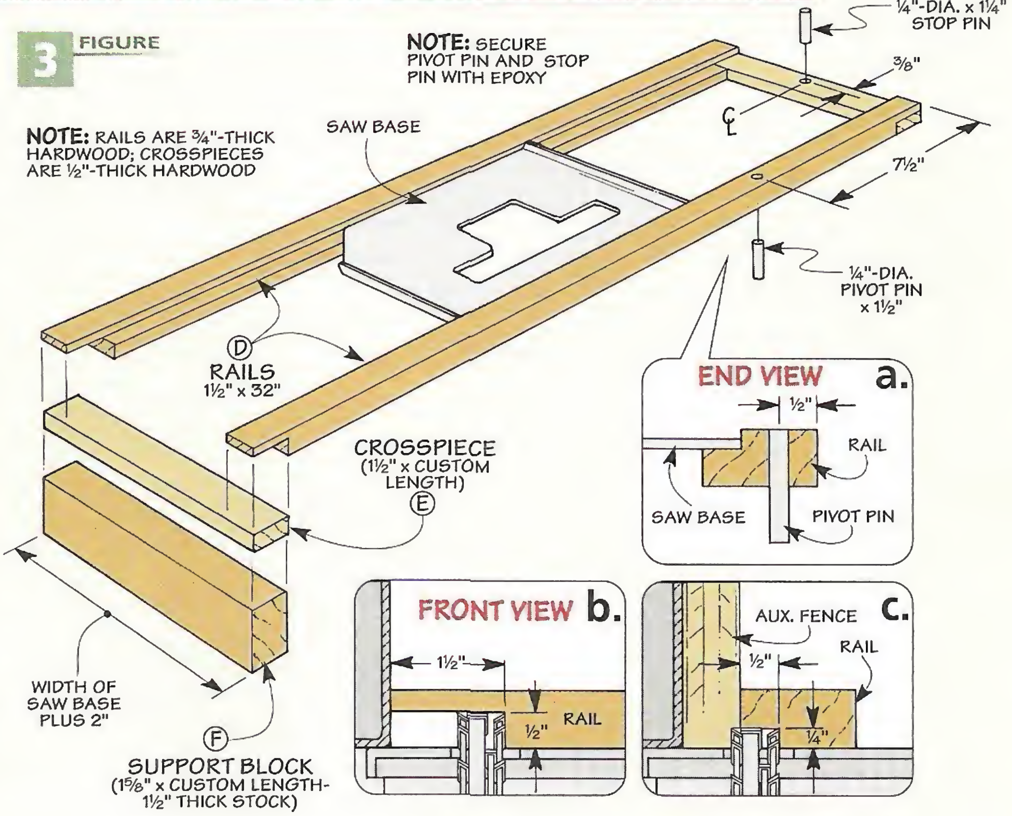
SAW CARRIAGE

The second part of the miter station is the saw carriage. This is a rectangular wood frame that guides the circular saw (Figure 1). A steel pin in one rail serves as the pivot point for the carriage. A second pin sticks up at the far end of the carriage to act as a stop for the saw at the end of a cut.

Rails – The *rails (D)* are long, narrow pieces of 3/4"-thick hardwood. Take a look at Figure 3 and you'll see that a notch needs to be cut in each end of the rails to accept the cross pieces that "tie" the carriage together. And a rabbet along the inside edge of each rail creates a lip that guides the metal base of the saw.

I cut the notches on the ends of the rails first, using a dado blade in the table saw. To do this, position the table saw rip fence 1½" from the *outside* of the blade to serve as a stop, as

3 FIGURE



NOTE: SECURE PIVOT PIN AND STOP PIN WITH EPOXY

NOTE: RAILS ARE ¾"-THICK HARDWOOD; CROSSPIECES ARE ½"-THICK HARDWOOD

shown in Figure 3b. Then set the blade height to ½". Now cut a notch on each end of each rail.

The next step is cutting the rabbets to make the track that the saw rides on. These rabbets are cut on the opposite face from the notches. And you don't have to change the dado blade setup. As Figure 3c shows, all you need to do is attach a wood fence to the rip fence and "bury" part of the blade in it, leaving ½" of the blade exposed. Then lower the blade to cut a ¼"-deep rabbet.

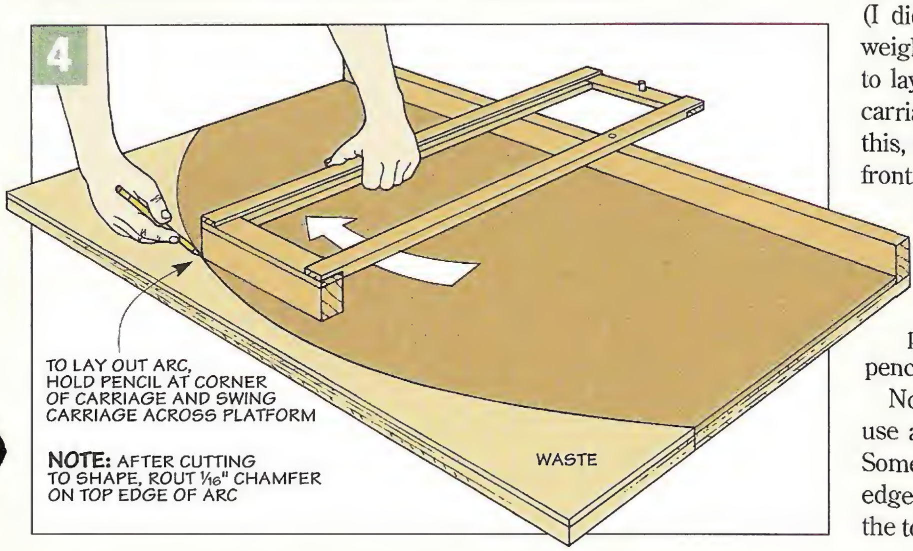
Crosspieces – With the rails complete, the next step is to add the two *crosspieces (E)*. The length of these pieces is determined by the width of the metal base of your saw. Simply measure the saw's base and add 2" to allow for the width of the rails. The crosspieces are ½" thick so that when they're glued into the notches in the rails, they sit flush with the bottom of the rails.

Before assembling the carriage, a couple of holes need to be drilled. Take a look at Figure 3 and you'll see that one hole is drilled through a crosspiece and the other is drilled through a rail. Later, steel pins are glued into each of these holes to serve as the carriage pivot pin and the stop for the saw.

Now you're ready to glue up the rails and crosspieces to make the saw carriage. The thing to be aware of here is the distance between the rails. The idea is to have the saw slide in the completed carriage with no "slop." An easy way to get this spacing is to clamp the rails around the base of the circular saw while the assembly dries.

Support Block – After the carriage has dried, a *support block (F)* is added under the undrilled crosspiece (Figure 1). This block supports the end of the carriage and keeps the carriage level when it's placed on the fence. The support block is the same width and length as the crosspiece.

4



TO LAY OUT ARC, HOLD PENCIL AT CORNER OF CARRIAGE AND SWING CARRIAGE ACROSS PLATFORM

NOTE: AFTER CUTTING TO SHAPE, ROUT 1/16" CHAMFER ON TOP EDGE OF ARC

To complete the carriage, all that's needed are the stop and pivot pins. These are cut from the unthreaded portions of a couple of bolts (see margin). Note that the pivot pin glued into the rail (Figure 1b) is longer than the stop pin glued into the crosspiece (Figure 1c). I filed a slight chamfer on each end of the pins to make it easier to fit the pins into the holes.

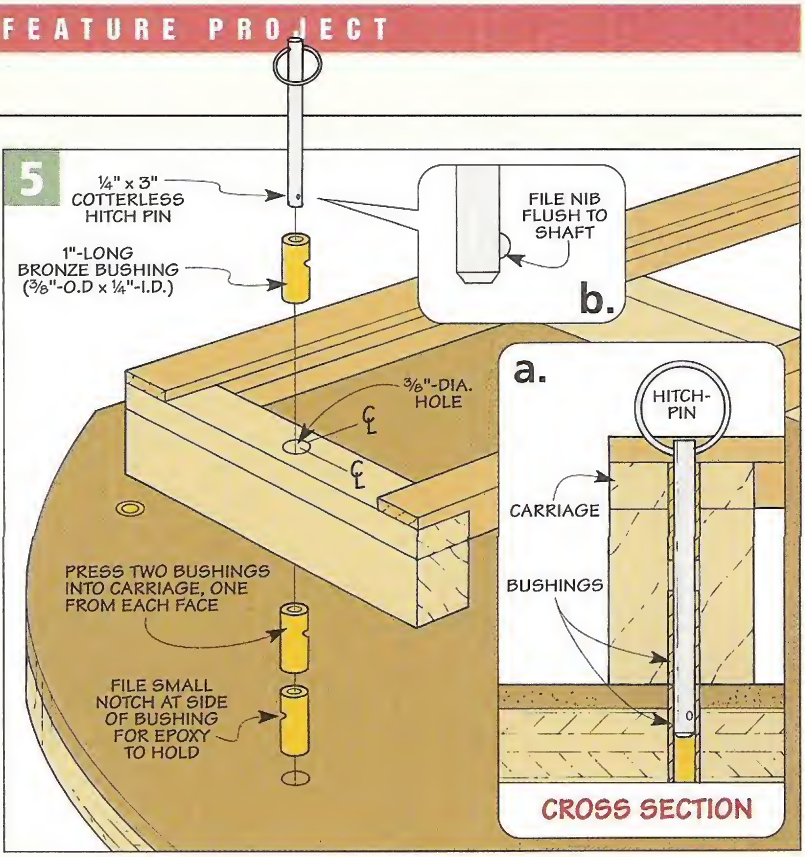
Cut Arc – After the pins are epoxied in place, you can trim the back edge of the platform to shape. (I did this to reduce the size and weight of the platform.) An easy way to lay out the arc is to use the saw carriage as a giant compass. To do this, simply hold a pencil at the left front corner of the carriage and swing the carriage from one side of the platform to the other, like you see in Figure 4. (Note: If your carriage pivots on the left rail, hold the pencil at the right front corner.)

Now set the carriage aside and use a jig saw to cut along the line. Some sanding will smooth the back edge. Then rout a 1/16" chamfer on the top of the curved edge.

▲ *Steel Pins. The pivot pin and the stop are cut from the unthreaded portion of a bolt.*

Stop System

▲ *Indexing System Hardware. A cotterless hitch pin that fits into bronze bushings forms a precise indexing system.*


5
¼" x 3" COTTERLESS HITCH PIN
1"-LONG BRONZE BUSHING (⅜"-O.D x ¼"-I.D.)
⅜"-DIA. HOLE
℄
℄
PRESS TWO BUSHINGS INTO CARRIAGE, ONE FROM EACH FACE
FILE SMALL NOTCH AT SIDE OF BUSHING FOR EPOXY TO HOLD
FILE NIB FLUSH TO SHAFT
b.
a.
HITCH-PIN
CARRIAGE
BUSHINGS
CROSS SECTION

The key to the precision of this project is the index holes that let you position and lock the carriage to make perfect 90° crosscuts and 45° miters every time. It's important that these holes are in exactly the right places. But don't worry. There's an easy way to make sure you drill them right where they should be.

Index Holes – I started by laying out the indexing holes at the 45° positions. If you look at Figure 6, you'll see that a combination square can be used to position the carriage at a 45° angle to the fence. Then clamp the carriage in place.

But I didn't trust my combination square to be exactly 45°. So before drilling the indexing hole, I thought it would be a good idea to check the position of the carriage to make sure it was dead-on.

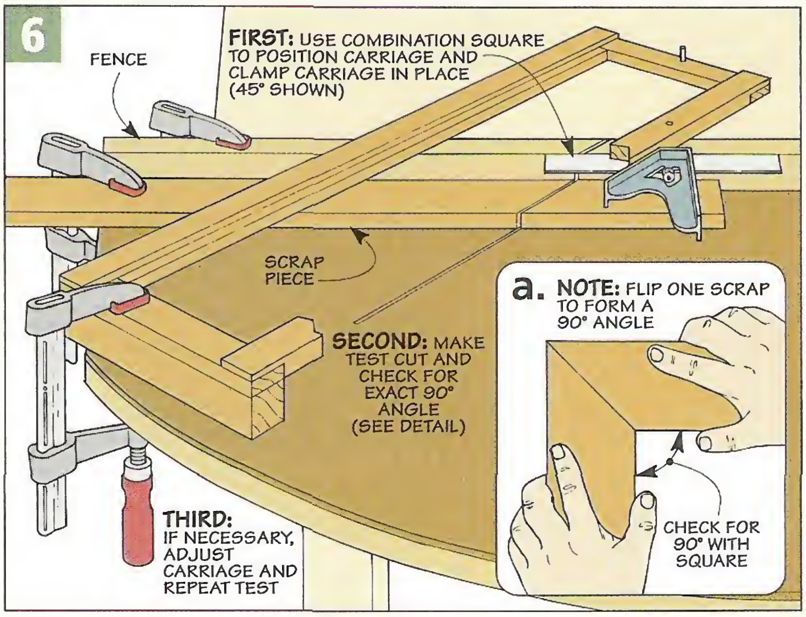
To do this, place a piece of scrap on the platform and cut through the scrap. (See "Setup and Use" on the opposite page.) Then flip one piece of the scrap over as shown in Figure 6a, and place the mitered edges together. If the two pieces form a perfect 90° angle, the carriage is properly positioned. If the angle is off, nudge the carriage slightly and try the test again until you end up with an exact 90° angle. Then go ahead and drill the indexing hole, as shown in Figure 7.

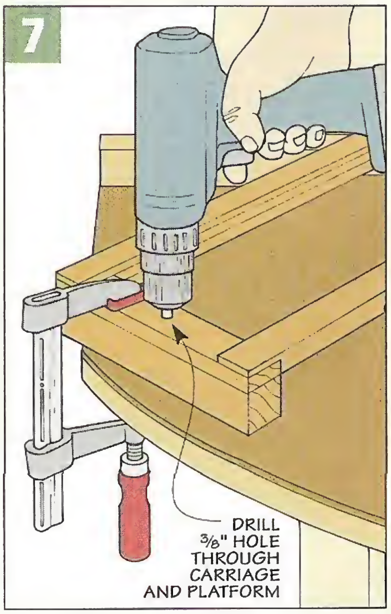
To locate the opposite 45° angle, simply repeat this process. Finally, use a try square to position the carriage for the 90° indexing hole.

Note: If you think you'll be cutting other angles frequently, go ahead and drill holes for those angles.

Bushings – The holes in the platform and saw carriage accept the index pin that locks the carriage in place (Figure 5). Moving this pin in and out repeatedly could enlarge the holes, so I lined the holes with bronze bushings.

The bushings I used were 1" long. However, the platform is just under 1" thick, so the bushings stick up above the surface slightly. A few strokes with a file on each bushing fixed that. Then the bushings are


6
FENCE
FIRST: USE COMBINATION SQUARE TO POSITION CARRIAGE AND CLAMP CARRIAGE IN PLACE (45° SHOWN)
SCRAP PIECE
SECOND: MAKE TEST CUT AND CHECK FOR EXACT 90° ANGLE (SEE DETAIL)
THIRD: IF NECESSARY, ADJUST CARRIAGE AND REPEAT TEST
a. NOTE: FLIP ONE SCRAP TO FORM A 90° ANGLE
CHECK FOR 90° WITH SQUARE


7
DRILL ⅜" HOLE THROUGH CARRIAGE AND PLATFORM

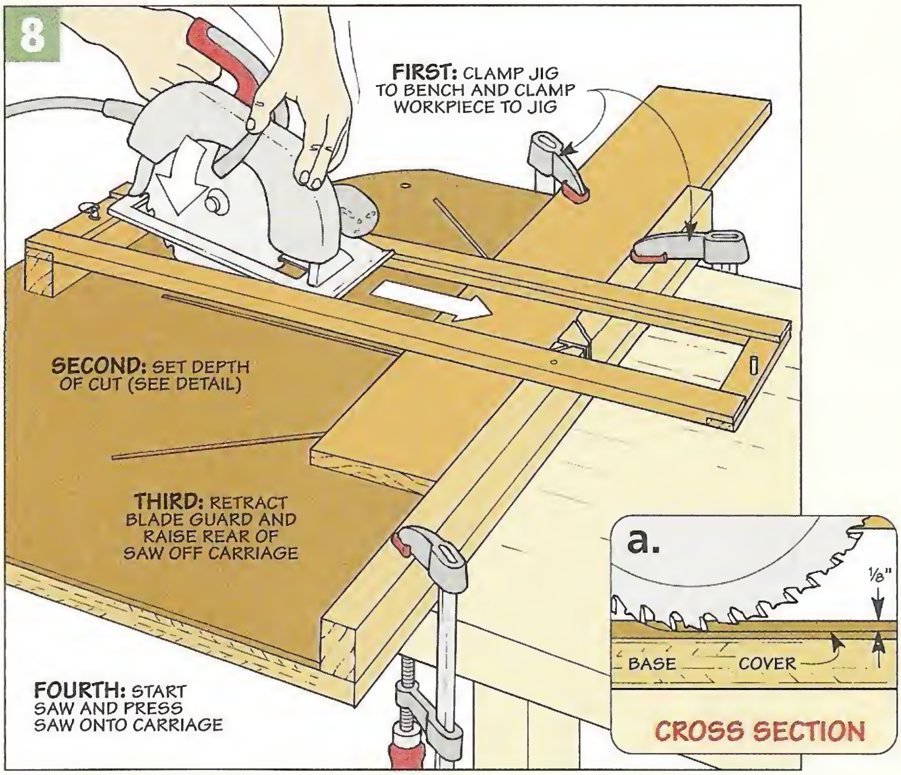
secured in the holes with epoxy. (Note: Remove the hardboard cover first to avoid gluing it to the base.)

On the carriage, I pressed in a bushing from each face (Figure 5).

There's also some quick filing that needs to be done on the index pin. If you look at Figure 5b, you'll see that a small spring-loaded nib sticks out from one side of the pin. I filed this nib flush with the shaft of the pin to make it easy to get the pin in and out.

SETUP AND USE

Using the miter station is easy. You'll want to clamp it to your bench or a pair of sawhorses to keep it stable, as shown in Figure 8. (See the photo below for a way to clamp it in a portable workbench.) Then clamp your workpiece to the miter station platform to keep it from shifting during the cut. And like you see in Figure 8a, set the blade depth to cut just 1/8" into the hardboard cover.



FIRST: CLAMP JIG TO BENCH AND CLAMP WORKPIECE TO JIG

SECOND: SET DEPTH OF CUT (SEE DETAIL)

THIRD: RETRACT BLADE GUARD AND RAISE REAR OF SAW OFF CARRIAGE

FOURTH: START SAW AND PRESS SAW ONTO CARRIAGE

To make a cut, place the saw in the carriage and retract the blade guard slightly. Before turning the saw on, raise the rear of the saw to lift the blade off the cover, as shown in Figure 8. (This keeps the saw from lurching back when you turn it on.) Now just squeeze the trigger, lower the saw onto the carriage, and push the saw along to the stop pin.

Safety Note: When you reach the end of the cut, let the saw blade stop rotating before lifting the saw from the carriage. Otherwise, the blade may bind in the fence and kick back.

Other Features

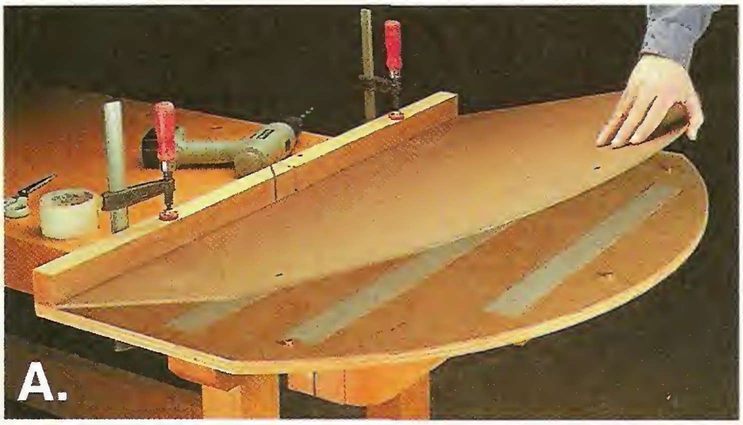
Here are some tips to help you get the most from your miter station.

Replaceable Cover – The hardboard cover is held on with carpet tape so that it can be replaced if it gets chewed up over time.

The old cover can be used as a template to lay out the shape of the new cover and the location of the indexing holes. Cut the new cover to size, put fresh carpet tape on the base and press the cover in place, like you see in photo A.

Other Angles – You can use the miter station to cut any angle between 45° and 90° by simply clamping the carriage in the desired position, as shown in photo B.

Clamping Cleat – Portability is a great feature of the miter station. Photo C shows how a cleat screwed to the bottom of the platform allows you to clamp the station in the jaws of a portable workbench.


A.

B.

C.

The Whole Story On

Drilling Large Holes

A drill press and a good set of brad point bits or twist bits will probably handle about 95% of the holes you'll ever need to drill. That's because most of the time you're drilling small diameter holes. But the first time you need to drill a hole larger than say, an inch, you'll probably find yourself having to purchase a special bit.

Points to Consider – Bits for making large holes aren't difficult to find — just open any woodworking catalog. However, there's more to selecting a bit than just knowing the size of the hole you want to make. The material you're working with, whether it's a through or blind hole, and the type of work you're doing all factor into the equation. What works for one hole may not work for the next. And if you have to drill a lot of holes, you might want to choose a different method than you would for drilling just one or two.

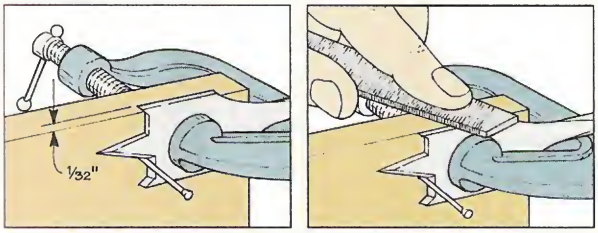
So how do you decide? Here's a look at several different types of commonly available bits and tools for making large holes, along with an examination of some of the strengths and weaknesses of each. Plus there's also a couple of methods for creating large holes that you may not have seen before.

Spade Bit

▲ *Spade Bit. Spade bits are quick and inexpensive.*

When it comes to drilling large holes, spade bits are the workhorses of the stable. They're tough, work quickly, and are inexpensive (a couple of bucks apiece). They are probably also about the simplest bit you can find. Just a rod of steel that's been flattened at one end. A long centerpoint and a couple of spurs on each side guide the bit and score the perimeter of the hole.

Size – Spade bits range in size from ¼" to 1½" in diameter. They can be used in a hand-held drill or in a drill press (at slow speed). And when they become dull, they can be thrown out and replaced or simply touched up with a file.



▲ *Modifying a Spade Bit. Using a nail as a stop, clamp the bit to a scrap block so the side of the bit stands slightly proud. File down the side of the bit, then flip it over and repeat the process on the other side.*

Rough Work – Despite these advantages, spade bits are really designed for construction work or where the appearance of the finished hole doesn't make a bit of difference. The sides of the hole are left looking rough and jagged. And they tend to splinter the wood when exiting the hole. (You can often minimize this by placing a backer board behind or underneath your workpiece.)

Still I like to keep a couple sets of spade bits on hand in the shop for those times when I don't want to take a chance on damaging some of my more expensive bits.

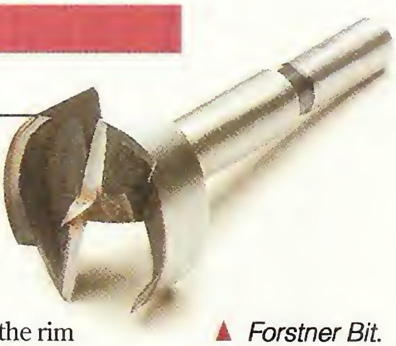
Spade bits have one other advantage over many other types of bits. If you ever need an odd-sized hole, it's a pretty simple procedure to modify an existing bit to match the exact size you need, as you can see in the drawings at left.

Forstner Bit

Although spade bits work fine for for rough holes, they're not very accurate. When it comes to drilling clean, precise holes, nothing excels like a Forstner bit.

Solid Rim – The secret of a Forstner bit is the rim. Instead of a couple of little spurs, the rim of a Forstner bit is solid. Its sharp edges cleanly score the outside of the hole as the bit plunges into the wood. The result is a hole with clean, smooth sides and hardly any tearout.

The rim also guides the bit, keeping it from wandering. This is what really sets Forstner bits apart from just about every other bit. Because the bit is guided by the rim instead of the center, you can drill overlapping holes and angled holes with ease.

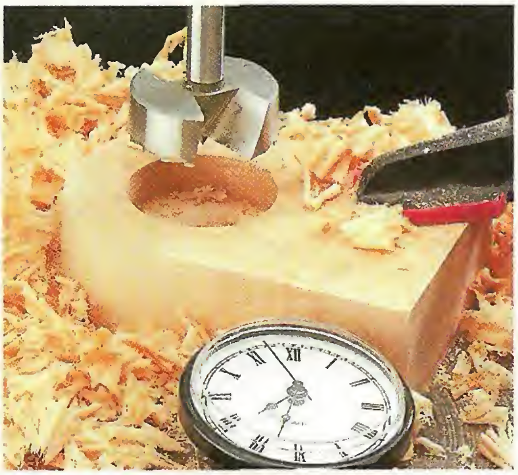


▲ *Forstner Bit. This bit is great for drilling flat-bottomed holes.*

As important as the rim is, it doesn't actually create the hole. The bulk of the waste is removed by a pair of knife-like cutting edges on each side of the center point of the bit. These slice away the wood in large shavings, creating a perfectly flat-bottomed hole — one of the main benefits of a Forstner bit.

Cost – Forstner bits vary considerably in price, according to their size and, more importantly, their quality. The less-expensive bits will do the job, but the edges of the bit don't seem to hold up as well as on the more expensive bits. And the edge of the hole tends to be a little bit rougher than with the higher-priced bits.

Sawtooth Bit

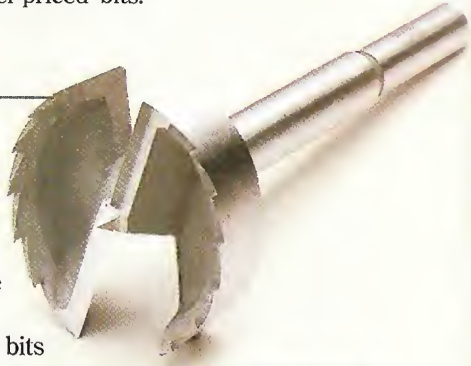


A closely-related cousin to the Forstner bit is the sawtooth bit. This bit gets its name from the jagged teeth that line the rim of the bit. The teeth help to dissipate the heat better than the solid rim of a standard Forstner, preventing the bit from overheating and burning the workpiece. As a result, sawtooth bits drill holes a little faster than Forstner bits, which is a plus if you're in a hurry or have a lot of holes to make.

Sawtooth bits work best when used perpendicular to the workpiece. They don't drill angled holes as well as Forstner bits because the teeth on the rim of the bit tend to catch and tear the wood as you try to start the hole.

Like Forstner bits, sawtooth bits can be used to drill a hole with a flat bottom. So they're a good choice for drilling a counterbore to house a clock movement (see photo) or any other large recess. Sawtooth bits range from 1/4" all the way up to 4" in diameter.

Shank Size – One thing to consider when selecting a sawtooth or Forstner bit is the size of the shank. A thicker shank prevents the bit from chattering. And a longer shank will allow you to drill deeper holes. (Something to keep in mind when comparing prices on these types of drill bits.)



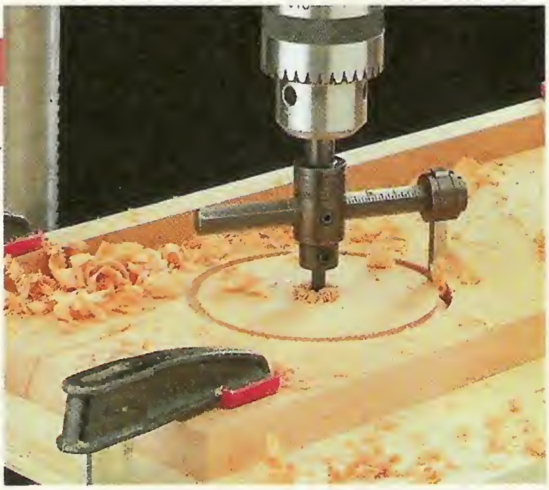
▲ *Sawtooth Bit. A sawtooth bit is basically a Forstner bit with teeth.*

Cost – Sawtooth bits tend to be a little less expensive than traditional Forstner bits, and I find that they work almost as well. (Forstners leave a slightly cleaner edge on the hole.) A Forstner or sawtooth bit is usually my first choice when I need to drill a large hole for a furniture project. But because these bits are fairly pricey in the large sizes, I buy them only as the need arises.

Slow it Down – Whether you use a sawtooth bit or a Forstner bit, the trick to drilling large holes is to take it slowly. Set your drill press at slow speed and back the bit out frequently to clear it of chips. This will help prevent the bit from overheating and burning your workpiece.

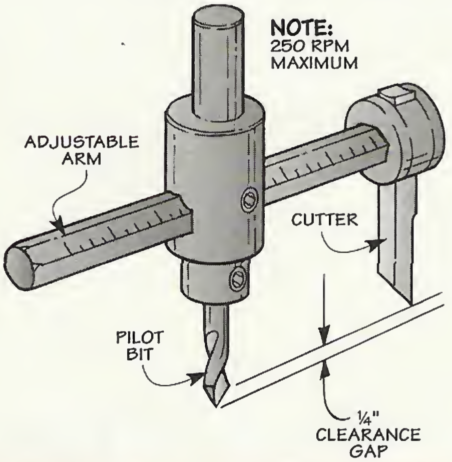
Wing Cutter Bit

▲ *Wing Cutter.* With a wing cutter, you can make holes from 2" to 8" in diameter.



Although Forstner and sawtooth bits work great, they're typically available only up to 4" in diameter. What if you need to make a larger hole than this? One solution is to use a wing cutter.

A wing cutter (sometimes called a "fly cutter") works quite differently than most bits. Instead of drilling *out* a hole, the wing cutter simply cuts *around* the hole, leaving a cookie-size waste piece in the center. To do this, a wing cutter uses a sharpened cutter that is attached to an adjustable arm. As the bit rotates, the cutter scores the perimeter of the hole. A center pilot bit helps to guide the cutter.



Adjustable – The biggest advantage to a wing cutter is that the arm that holds the cutter can be moved in or out. A scale on the arm helps in adjusting the bit. So with this one bit, you can cut an infinite variety of hole sizes (from about 2" to 8").

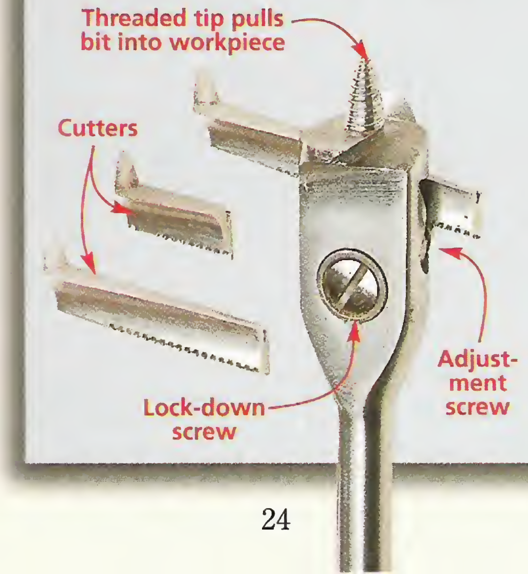
Because they don't remove the waste from the center of the hole, wing cutters can only be used to cut through holes. And they also won't work on stock thicker than an inch. Because of this, I typically use a wing cutter for cutting out large holes in sheet goods (for speakers, light fixtures, etc.).

Using a wing cutter for the first time can be a little bit unnerving. That's because you've got this rather heavy cutter swinging around on the end of the arm. Combine this with the fact that wing cutters tend to chatter and vibrate while in use, and it may seem like an accident waiting to happen. But there are a few tips that can take away some of the anxiety associated with wing cutters.

First, the drill press speed should be set to 250 rpm or less. (Never use a wing cutter in a hand-held drill.) Next, make sure your workpiece is securely clamped in place. And finally, check to see that the set screws which hold the cutter, pilot bit, and adjustable arm in place are all firmly tightened.

Expansive Bit

Wouldn't it be great if you could buy just one bit that would cut almost any size hole? That's the idea behind an *expansive bit.* Designed to be used in a hand brace (see photo at right), expansive bits have been around for over a hundred years.



The expansive bit is something of a hybrid. The end of the bit resembles a traditional auger bit. But it holds an adjustable cutter that works more like the wing cutter shown above. A row of teeth along the edge of the cutter allows you to adjust the diameter of the bit. By using different sizes of cutters, you can make holes ranging from ⅞" to 3", see photo at left. All you do is chuck the bit up in a brace and start boring.

Like most "one size fits all" items, expansive bits don't work nearly as well as their individual counterparts. Although you can drill holes with this bit, it's a real chore, especially when you start getting above 1½". On top of this, the quality of the hole is pretty rough, especially for making furniture. Still, it works in a pinch.

Hole Saw

Hole saws aren't really "bits" in the traditional sense. As the name implies, a hole saw is really a small, cylindrical saw that is mounted on an arbor. The saw cuts a round "plug" out of a workpiece, leaving behind a hole. The arbor also holds a twist bit that serves as pilot for the saw.

Hole saws typically range in diameter from $1^1/_4$" to 6". With the higher quality holes saws, you can purchase different diameter saws that will all fit on the same arbor. (These are often packaged in sets.)

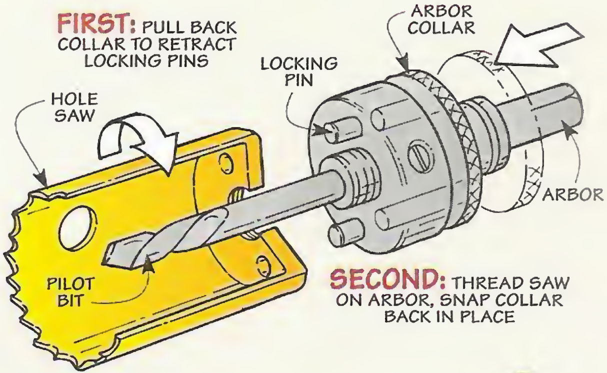
Like spade bits, holes saws are really more useful in construction than they are in furnituremaking. They're great for creating a hole for a lockset or drilling holes through wall studs for pipes or electrical wiring. But as you might expect, the hole is fairly rough. And they generate a lot heat as they cut, sometimes burning the wood around the hole.

Like the wing cutter, hole saws are only useful for making through holes. And the depth of the hole is limited by the length of the hole saw.

One of the problems I've had with hole saws in the past is that the saw gets jammed onto the arbor threads so tightly that it becomes almost impossible to remove when you want to change saw sizes. But then I found a neat hole saw from Starrett that solves this problem, as you can see below.

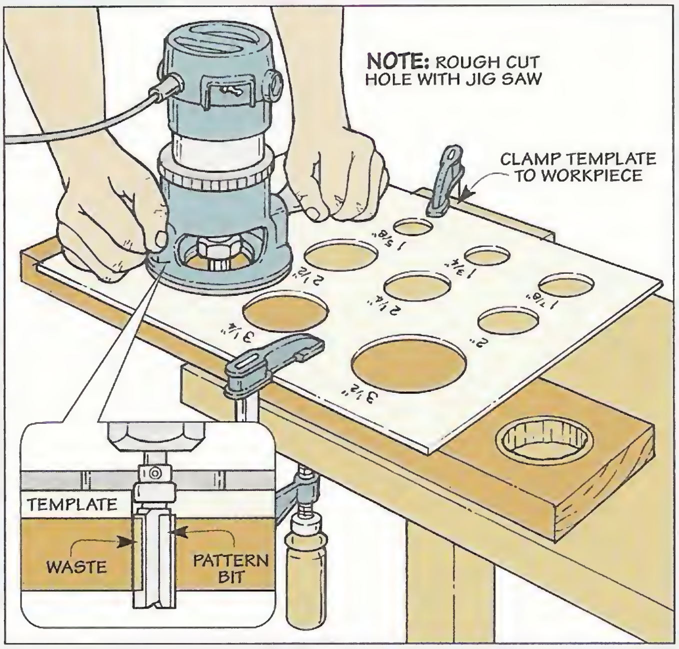
Quick Change – The arbor on this hole saw has a couple of lock pins that snap down and engage a couple of holes in the saw, preventing it from becoming jammed onto the threads too tightly. To remove the saw, all you have to do is pull back on the collar of the arbor to retract the pins. Then the saw easily spins off the threads.

▲ *Hole Saw. Hole saws are great for installing locksets.*



FIRST: PULL BACK COLLAR TO RETRACT LOCKING PINS
ARBOR COLLAR
LOCKING PIN
HOLE SAW
ARBOR
PILOT BIT
SECOND: THREAD SAW ON ARBOR, SNAP COLLAR BACK IN PLACE

Router Template

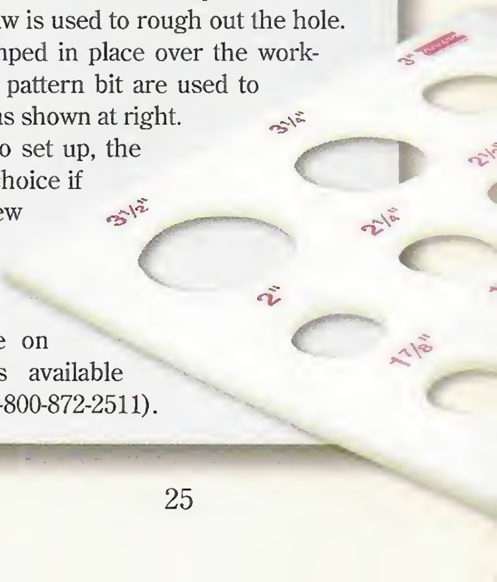


NOTE: ROUGH CUT HOLE WITH JIG SAW
CLAMP TEMPLATE TO WORKPIECE
1 5/8
1 3/4
1 7/8
2 1/2
2 1/4
2
3 1/4
3 1/2
TEMPLATE
WASTE
PATTERN BIT

You probably wouldn't think of using a router for "drilling" large holes. But when combined with a pattern bit and the circle template shown below, a router can create very smooth and precise holes.

The template is nothing more than a piece of high-impact plastic, with holes ranging from $1^1/_4$" to $3^1/_2$" in diameter. Creating a hole with the template is a two-step process. First, a jig saw is used to rough out the hole. Then the template is clamped in place over the workpiece, and the router and pattern bit are used to trim the edge of the hole, as shown at right.

Because it takes time to set up, the circle template is a good choice if you only need to create a few holes, or if you need to create several different sizes of holes and don't want to spend a fortune on individual drill bits. It's available through Eagle America (1-800-872-2511).



3"
3¼"
3½"
2½"
2¼"
2"
1⅞"

SHOP PROJECT

Drop-In
Drawer Organizers

Interested in space-saving ideas for drawer storage? With an adjustable insert and a pair of handy totes, cleaning up the clutter just got easier.

Bigger is better. At least that's what I thought when I built a storage unit for my shop. I added large drawers that I was sure would make it easy to "hide" away all the things that used to be out in the open in my shop. And hide they did.

As time went on, looking through the drawer to find something I needed was more like a search and rescue mission. Whatever I was looking for seemed to find its way to the bottom of the drawer — somewhere near the back corner.

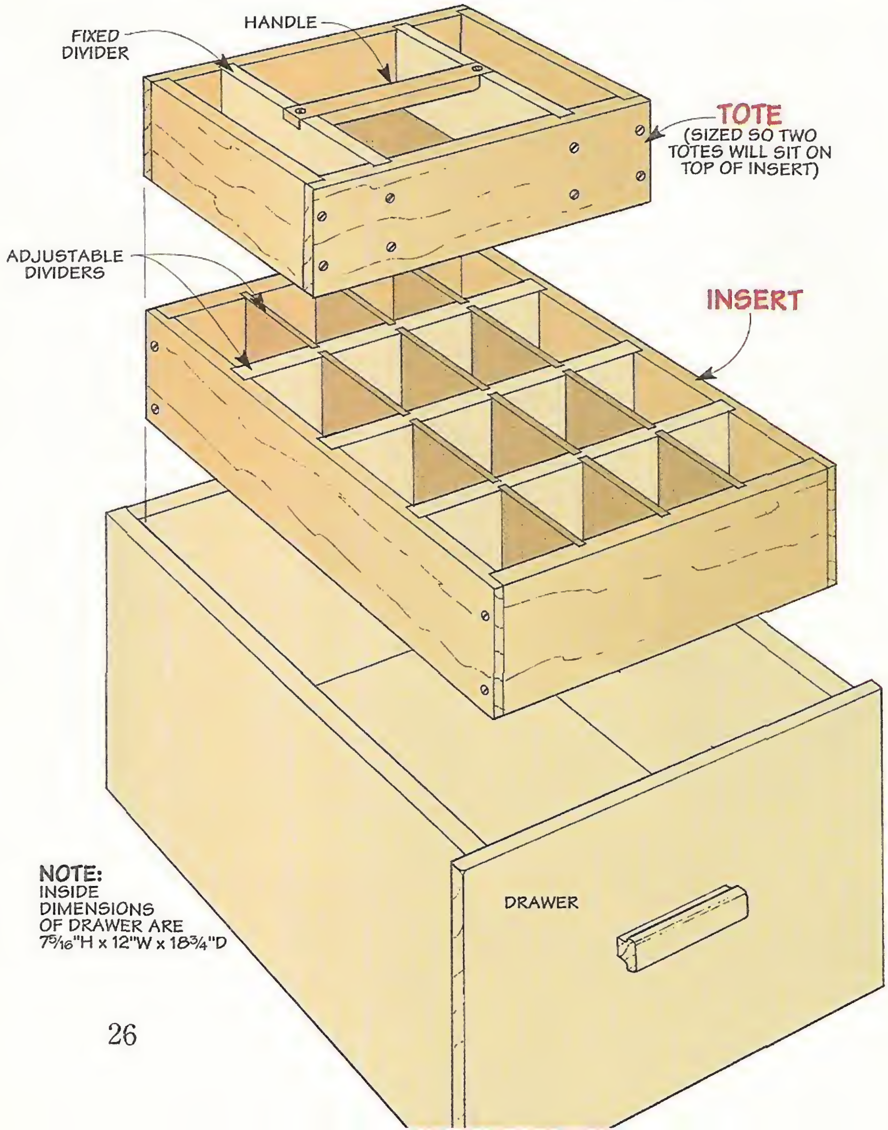
Drop-In Organizers – To solve this problem, I built the drop-in organizers shown in the photo above. An *insert* that fits into the bottom of the drawer has adjustable dividers you can change to store a wide variety of items.

Resting on top of the insert are a pair of *totes*. Each tote has a set of fixed dividers and a handle. Besides being easy to organize, you can pull the tote from the drawer and take it right where it's needed. Note: Only one tote is shown at left.

For my drawer, I built a single insert and a pair of totes. But the nice thing is you can build any combination of inserts and totes you need. So if you have a whole set of drawers to organize, simply mix and match them to customize each drawer.

Sizing the Organizers – Regardless of the arrangement, the organizers are built to fit the *inside* dimensions of the drawer. And the key to sizing them is to allow for a little ($^1/_{16}$") "slop." This way, you can easily slip the insert in place. Plus, it makes it easy to remove a tote without it jamming inside the drawer.

Insert – To size the insert, I first measured the overall length and width of the drawer. Then, since my drawer was $18^3/_4$" long, I sized the insert to be $18^{11}/_{16}$" in length ($^1/_{16}$" less). Likewise, the width of the



NOTE:
INSIDE DIMENSIONS OF DRAWER ARE $7^5/_{16}$"H x 12"W x $18^3/_4$"D

drawer was 12", so my insert ended up 11$\frac{15}{16}$" wide.

Determining the height (width) of the insert is a little trickier. That's because it depends on whether you stack any totes on top of the insert.

If you have a shallow drawer, simply measure its depth and then allow a $\frac{1}{16}$" clearance to make it easy to open and close the drawer.

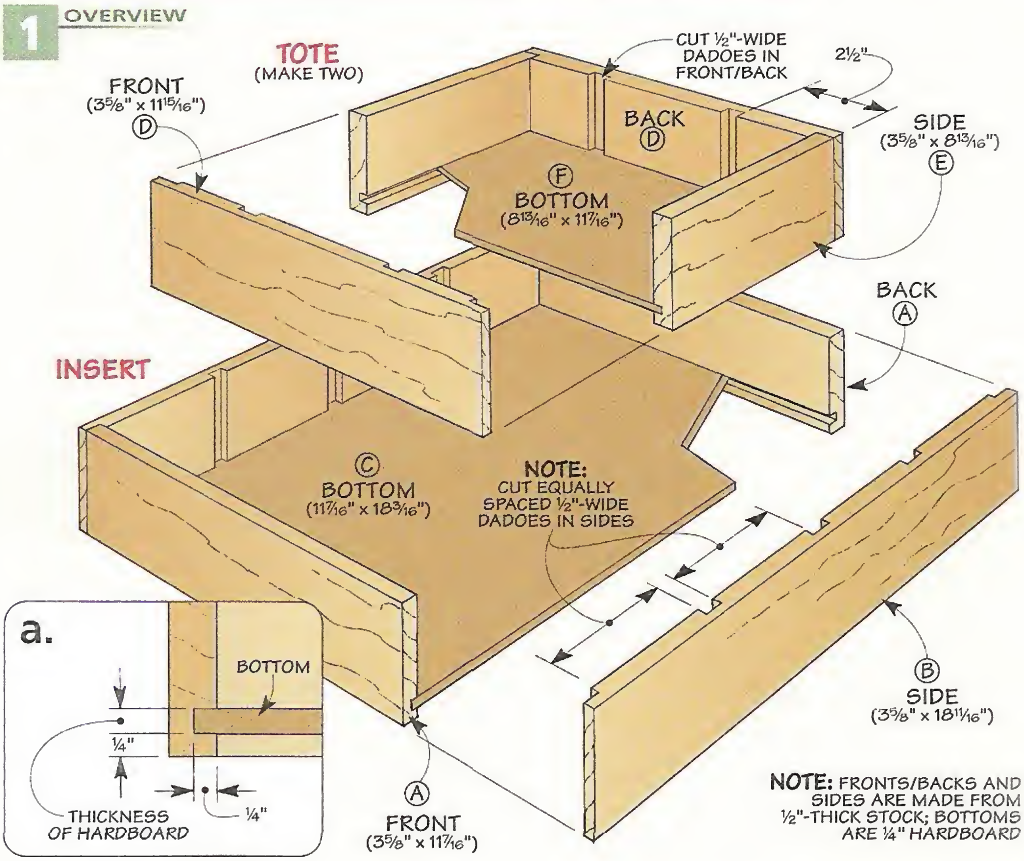
But if you're going to stack a tote (or two) on top like I did, you'll need to split the depth of the drawer in half (after allowing for the clearance). Since the inside height of my drawer was 7$\frac{5}{16}$", the height of my insert and each tote was 3$\frac{5}{8}$".

At this point, you're ready to cut the *front/back (A)* and *sides (B)* of the insert to final size (Figure 1). Just remember to allow for the rabbets in the ends of the sides when you cut the front/back to length.

The next step is to cut the rabbets. To do this, set the dado blade for a $\frac{1}{2}$"-wide cut. Then, after adding an auxiliary fence to the miter gauge (to prevent tearout) and rip fence (to avoid accidentally "shaving" into it), cut the rabbets (Figures 2 and 2a).

Dadoes – Since the dado blade is already set for a $\frac{1}{2}$"-wide cut, I spent some time cutting a set of matching dadoes in each side. These dadoes are for a set of dividers that are added later.

Bottom – Now, you can turn your attention to the bottom of the insert. The *bottom (C)* is nothing more than a piece of $\frac{1}{4}$" hardboard that fits into grooves cut near the bottom of the front/back and sides.


1 OVERVIEW
TOTE
(MAKE TWO)
FRONT
(3⅝" x 11$\frac{15}{16}$")
D
CUT ½"-WIDE DADOES IN FRONT/BACK
2½"
BACK
D
SIDE
(3⅝" x 8$\frac{13}{16}$")
E
F
BOTTOM
(8$\frac{13}{16}$" x 11$\frac{7}{16}$")
BACK
A
INSERT
C
BOTTOM
(11$\frac{7}{16}$" x 18$\frac{3}{16}$")
NOTE:
CUT EQUALLY SPACED ½"-WIDE DADOES IN SIDES
B
SIDE
(3⅝" x 18$\frac{11}{16}$")
a.
BOTTOM
¼"
THICKNESS OF HARDBOARD
¼"
A
FRONT
(3⅝" x 11$\frac{7}{16}$")

NOTE: FRONTS/BACKS AND SIDES ARE MADE FROM ½"-THICK STOCK; BOTTOMS ARE ¼" HARDBOARD

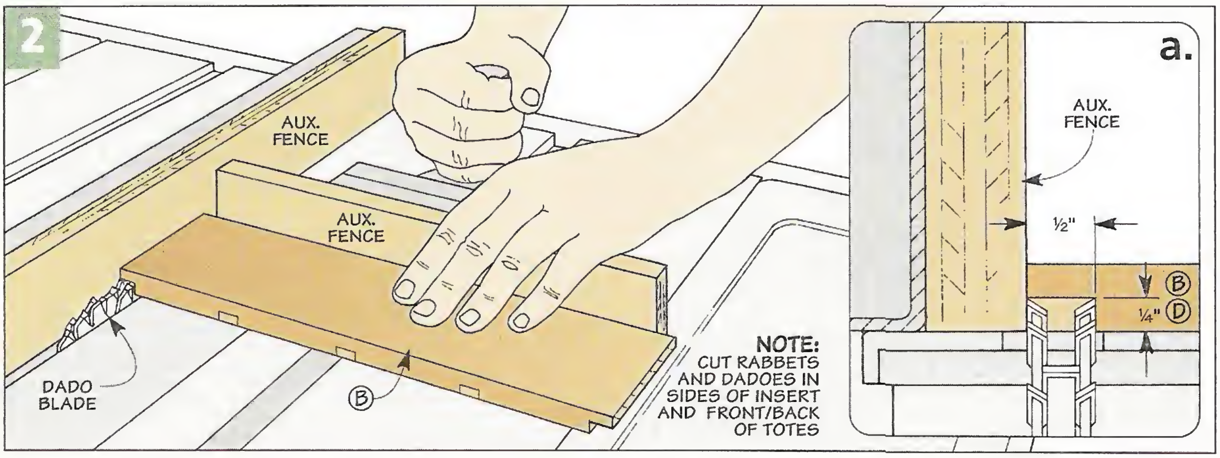
Since hardboard is rarely $\frac{1}{4}$" thick, a $\frac{1}{4}$" dado blade would have made for a loose fit. To get a snug fit, I reinstalled my $\frac{1}{8}$"-thick saw blade and made multiple passes to fit the hardboard exactly (Figure 1a).

At this point, you can set the parts for the insert aside. They won't be assembled until later after a little more work is done to fit the dividers.

Tote – Sizing the totes is almost identical to the insert. But there are a couple differences to keep in mind.

First, it's a good idea to allow a $\frac{1}{16}$" gap *between* the totes. This makes it easy to slip the second tote in place once the first one is in the drawer. And second, the rabbets and dadoes for the totes are cut in the front/back pieces, *not* the sides.

With that in mind, it's a simple matter to cut the *front/back (D)* and *sides (E)* to size. Then after cutting the rabbets and dadoes in the front/back, all that's left to do is cut the grooves for the two *bottoms (F)*.


2
AUX. FENCE
AUX. FENCE
DADO BLADE
B
a.
AUX. FENCE
½"
B
D
¼"

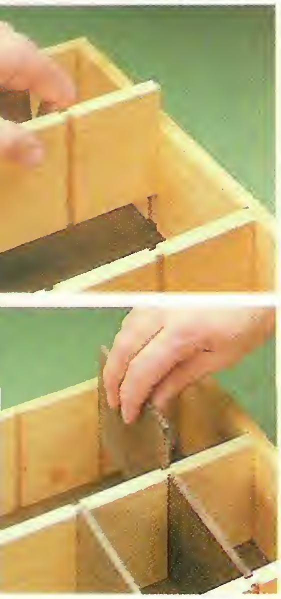
NOTE: CUT RABBETS AND DADOES IN SIDES OF INSERT AND FRONT/BACK OF TOTES

Dividers

The handiest thing about the insert is the two sets of adjustable dividers shown in Figure 3 and in the margin photos. As you can see in the photos at the bottom of the opposite page, these dividers make it easy to adapt the insert (and drawer) to suit the specific needs of your shop.

Dividers – One set of dividers fits into the dadoes cut earlier in the sides of the insert. These *main dividers* split the insert into two, three, or four compartments.

A second set of three different length dividers are then used to divide the insert into smaller compartments. These *subdividers* fit into dadoes in the front/back of the insert as well as both faces of the main dividers.



▲ *Adjustable dividers allow the compartments in the insert to be rearranged as your storage needs change.*

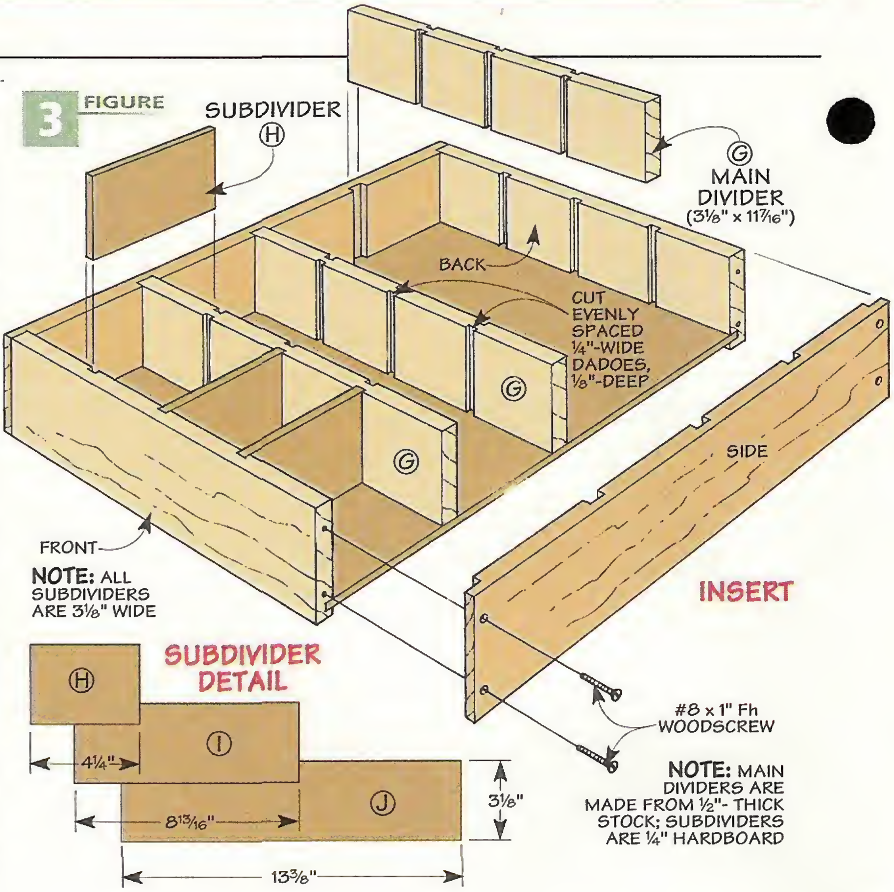


FIGURE 3

SUBDIVIDER
Ⓗ
Ⓖ
MAIN DIVIDER
(3⅛" x 11$\frac{7}{16}$")
BACK
CUT EVENLY SPACED ¼"-WIDE DADOES, ⅛"-DEEP
Ⓖ
Ⓖ
SIDE
FRONT
NOTE: ALL SUBDIVIDERS ARE 3⅛" WIDE
INSERT
SUBDIVIDER DETAIL
Ⓗ
Ⓘ
Ⓙ
4¼"
8$\frac{13}{16}$"
13⅜"
3⅛"
#8 x 1" Fh WOODSCREW
NOTE: MAIN DIVIDERS ARE MADE FROM ½"- THICK STOCK; SUBDIVIDERS ARE ¼" HARDBOARD

Main Dividers – But before you can cut the dadoes that the subdividers slip into, you'll first need to cut the main dividers to size from ½"-thick stock (Figure 3). Determining the length of the main dividers is easy — they're the same length as the front/back of the insert.

But they're not the same width. That's because they rest on the bottom of the insert. So I simply measured up from the top of the groove that holds the bottom and cut the *main dividers (G)* to width. (In my case, the main dividers were 3⅛" wide).

Layout Dadoes – Once the main dividers are cut to size, you can turn your attention to the dadoes the subdividers slip into. These dadoes are cut in the *inside* face of the front/back and *both* faces of the main dividers.

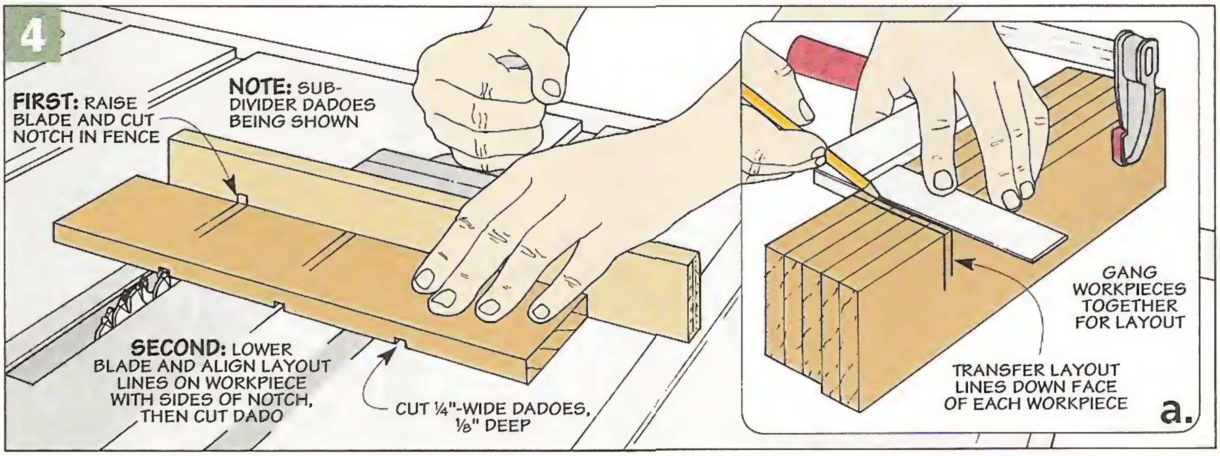
What's important here is that these dadoes line up across from each other. This way, the subdividers will slip easily into place without angling to one side or another.

The problem is you can't see the layout lines for the dado when you try to line them up with the dado blade. The solution is to use an alignment notch cut into an auxiliary fence attached to the miter gauge (Figure 4). But more about that later.

First, you'll need to lay out the location of the dadoes on the workpiece. To do this, "gang" the workpieces together and then use a square to mark matching layout lines on the top edge of each workpiece (Figure 4a).

Once that's complete, you can transfer the layout lines down the *outside* face of the front/back and on one face of the main dividers.

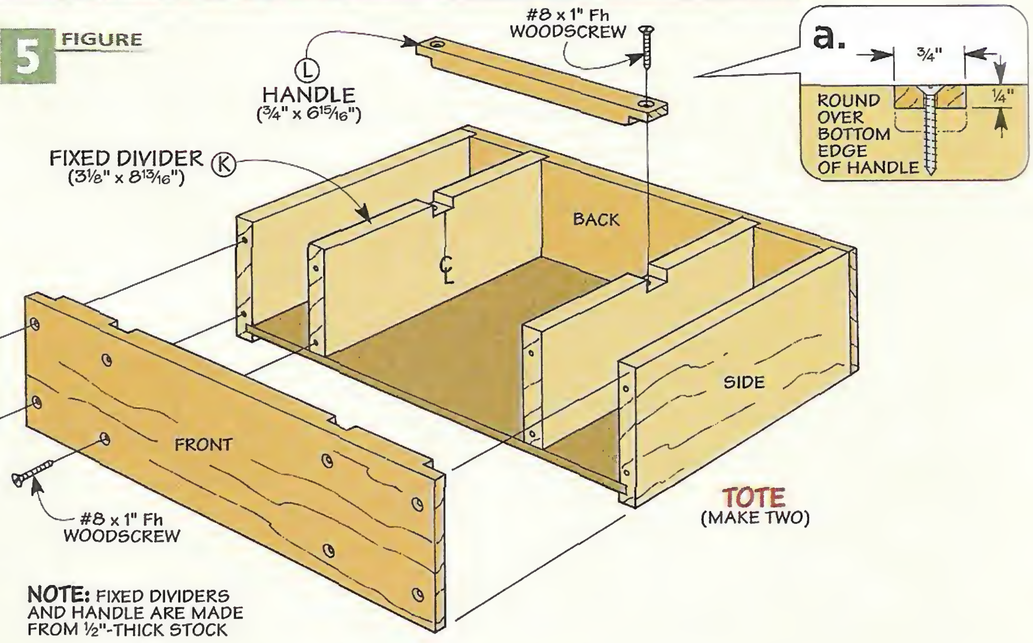
The next step is to set the dado blade for a ¼"-wide cut. Since my



4

FIRST: RAISE BLADE AND CUT NOTCH IN FENCE
NOTE: SUB-DIVIDER DADOES BEING SHOWN
SECOND: LOWER BLADE AND ALIGN LAYOUT LINES ON WORKPIECE WITH SIDES OF NOTCH, THEN CUT DADO
CUT ¼"-WIDE DADOES, ⅛" DEEP
GANG WORKPIECES TOGETHER FOR LAYOUT
TRANSFER LAYOUT LINES DOWN FACE OF EACH WORKPIECE
a.

5 FIGURE



NOTE: FIXED DIVIDERS AND HANDLE ARE MADE FROM ½"-THICK STOCK

hardboard was slightly *less* than ¼" thick, this will make it easy to slip the subdividers in and out.

Now you're ready to attach the auxiliary fence to your miter gauge. Then raise the dado blade to a height of ¾" and make a single pass to cut the alignment notch in the fence (Figure 4).

Cut Dadoes – At this point, cutting the dadoes is almost automatic. Simply align the layout line on the face of each workpiece with the notch and then cut the dado. Note: Be sure to reset the dado blade for an ⅛"-deep cut.

So how do you go about cutting the dadoes on the opposite face of each main divider? Easy — just flip them over and use the dadoes you already cut to align the workpieces.

Once all the dadoes are complete, you can assemble the insert. It's simply glued and screwed together.

Subdividers – Now all that's left to complete the insert is to cut the subdividers to size. As you can see in the Subdivider Detail, there are three different sizes. These *subdividers (H, I, J)* are made from ¼" hardboard and cut to fit between the dadoes in the front/back and main dividers. Note: I cut my subdividers to length for a slightly "loose" fit.

TOTE

At this point, you can turn your attention to the totes. Each tote has a pair of fixed dividers and a handle. Besides being easy to organize, the handle allows you to carry the tote right where you need it.

Fixed Dividers – Since the dadoes for the fixed dividers were cut earlier, the only thing left to do before assembling each tote is to cut the fixed dividers to size. Here again, the *fixed dividers (K)* are the same length as the sides of the tote. And like before, they're cut to width so they're flush with the top edge of the tote (Figure 5).

Notch – Before assembling each tote, you'll need to cut a shallow notch centered on the top edge of the fixed dividers (Figure 5a). These notches accept the handle for the tote. Once the notches are cut in each divider, you can glue and screw the tote together.

Handle – Completing each tote is just a matter of adding a handle. The *handle (L)* is nothing more than a strip of ¾"-thick stock with a rabbet cut at each end (Figure 5).

The rabbets fit into the notches cut in the top of the fixed dividers. These rabbets are sized so the handle is flush with the top edge of the tote. For a more comfortable grip, it's a good idea to ease the bottom edge of the handle before you screw it to the tote.

All that's left to do now is slip the insert into the drawer and add the totes. Once you divide things up, you'll be able to conquer the clutter in your drawers once and for all.

▼ *Hardware Storage. Turn your drawer into a miniature hardware store by dividing the insert into separate bins.*

▼ *Assembly Supplies. Taking your supplies right where you need them is easy with this handy drawer tote.*

▼ *Hand Tool Storage. Arrange the dividers of the insert into compartments of different sizes to suit specific needs.*

New Products

Woodworker's Guide

▲ *Print Version. A print version of the database is also available ($56).*

Woodworker's Guide

Woodworker's Indexing
woodworkersindexing.com

Rockler
800-279-4441

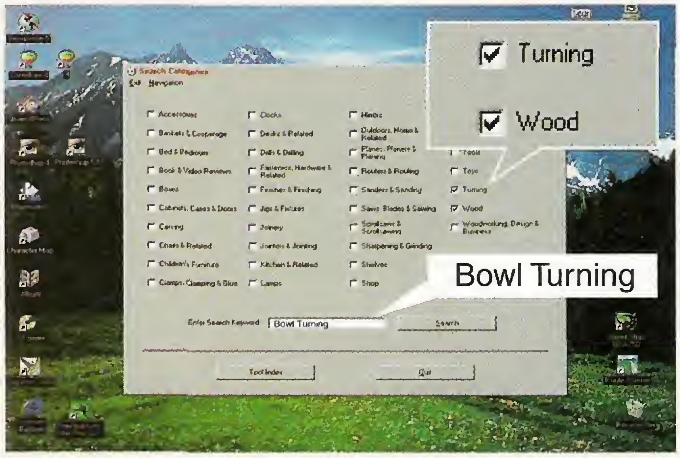
■ Past issues of woodworking magazines are a great reference source. The hassle has always been finding that technique article or project plan you saw six months ago. That's where the *Woodworker's Guide* comes in. It's a computer database that indexes articles from most of the major woodworking magazines that have been published in the last twenty-five years.

Sold as a Windows®–compatible CD-ROM, the *Guide* is more than just a database. Once it's installed on your personal computer, you can search through thousands of entries by keyword or by subject category (or both) to find the article you're looking for. Some of the entries even feature a brief summary of the article to further assist you in your search.

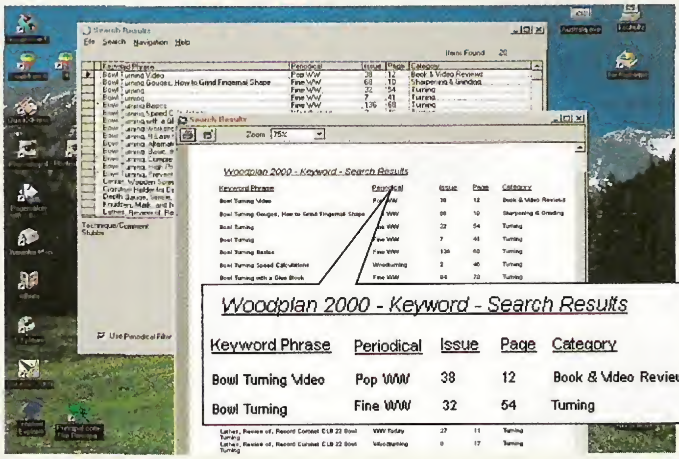
Filter – One of the most useful features of the *Guide* is the magazine "filter." It allows you to customize the database to match the magazines that are in your personal "library." So your search won't pull up entries for magazines you don't have. A simple click of the mouse allows you to turn the filter off if you want to search the entire database.

Trial Offer – The price for the CD-ROM database is $35. But for just $5, you can try out the *Woodworker's Guide* for 30 days. If you decide to keep it, the $5 will go towards the purchase price. Updates to the *Guide* (there's already one out for the year 2000) can be purchased annually to keep the index current.

And what if you don't own a computer? You're still in luck. The database is also available in a print version, see photo in margin.



1 *Search by Category and Keyword. To perform a search, first select the categories you want to search in, then type in the keywords you want to search under.*



Woodplan 2000 - Keyword - Search Results

Keyword Phrase	Periodical	Issue	Page	Category
Bowl Turning Video	Pop WW	38	12	Book & Video Reviews
Bowl Turning	Fine WW	32	54	Turning

2 *View or Print your Search. Search results appear as a list, identifying the magazine title, issue and page number of each article. The list can be printed out for reference.*

Blade-Loc

Blade-Loc

Woodsmith Store
800-835-5084

Woodcraft
800-225-1153

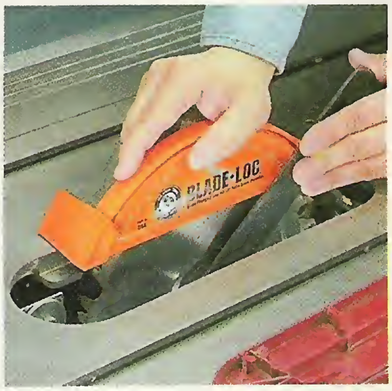
Rockler
800-279-4441

Garrett Wade
800-221-2942

■ Every once in awhile, a new tool comes along that's so simple, yet so practical, you have to stop and ask yourself, "Why didn't I think of that?" The Blade-Loc, by Bench Dog Tools, is just such a product.

Made of a tough plastic, the Blade-Loc fits over the top of a 10" saw blade, allowing you to safely grip the blade while loosening or tightening the arbor nut, see photo. This eliminates the time-honored tradition of hunting for a piece of scrap wood to jam against your table saw blade. The Blade-Loc also protects the fragile carbide teeth of the blade from being chipped if the arbor wrench should accidentally slip.

Blade-Loc carries a suggested price of $21.95, but it may pay to shop around. When I checked some of the retailers carrying the Blade-Loc, I found prices ranging from $13.95 to $20.99.



Sources

PRODUCT INFORMATION

Hardware & Supplies

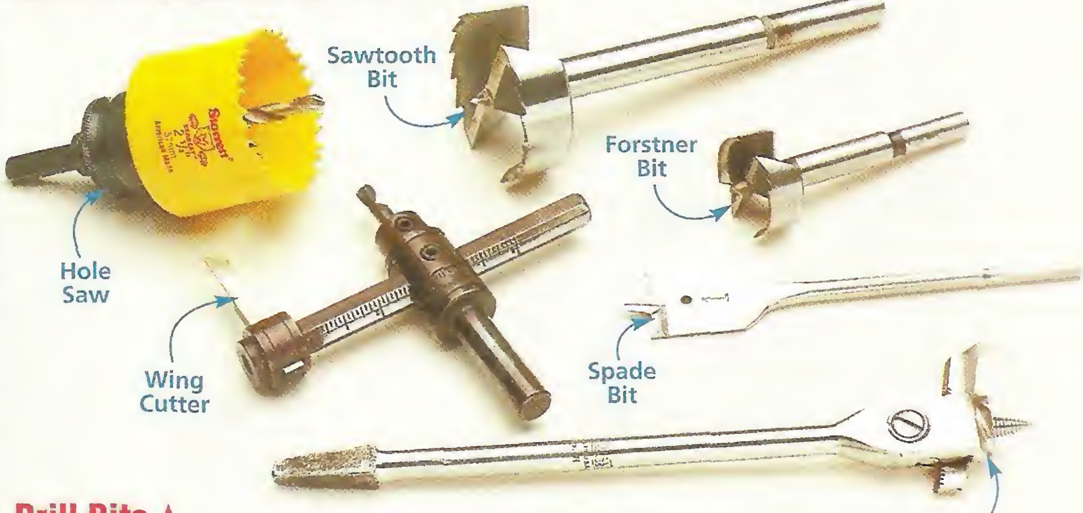
To make it easy to round up the hardware and supplies that you'll need to build the projects featured in this issue, we've put together a number of convenient mail-order sources.

Upcut Bit "Pulls" Chips from Workpiece
Downcut Bit "Pushes" Chips away from Router

Spiral Router Bits ▲

In the router jigs article on page 8, we used spiral router bits ($\frac{1}{2}$" shown above) to produce clean cuts with little (if any) tearout. These bits are available at many woodworking stores and from:

• Jesada	800-531-5559
• Woodcraft	800-225-1153
• Woodsmith Store	800-835-5084



Drill Bits ▲

There's nothing difficult about drilling a large hole (page 22). All it takes is the right bit. As you can see in the photo above, there is a wide variety of drill bits available for drilling large holes (something bigger than 1"). To make the right choice, you'll need to consider the type of hole you need to drill. Most of the bits shown above are for "rough" work. But if your project calls for a hole with smooth sides or a flat bottom, a Forstner or sawtooth bit is your best bet. Many of the bits shown above are available at woodworking stores, or your local home center or hardware store. If you can't locate what you need there, the following mail-order sources should be able to help you out:

• Lee Valley	800-871-8158
• Woodcraft	800-225-1153
• Woodsmith Store	800-835-5084

Router Raizer ▲

Although not much more than a handful of hardware, the Router Raizer kit (page 6) allows you to modify your router to make it easy to raise (or lower) the router bit from the top of a table-mounted router. This kit contains all the parts you need to modify any one of over a dozen plunge routers available today. The Router Raizer kit is available from the following mail-order sources:

• Puckett Tools & Fasteners	800-544-4189
• Woodcraft	800-225-1153
• Woodsmith Store	800-835-5084

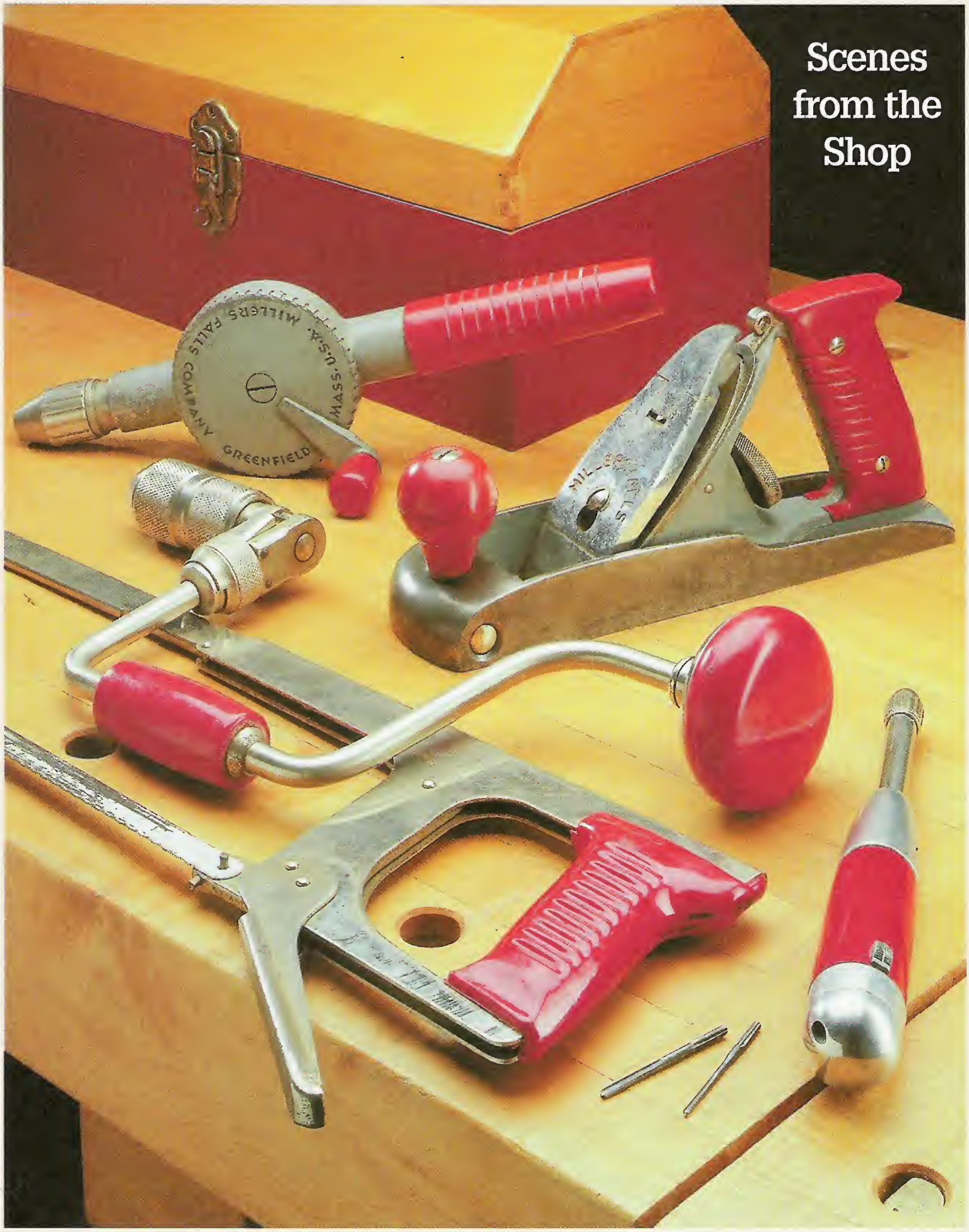
OPTIONAL INSERT KIT

Rout-R-Lift ▲

Another way to change the height of the router bit is with the Rout-R-Lift (page 6). But instead of moving the bit, the Rout-R-Lift raises and lowers the router. To do this, it's attached to an aluminum carriage on the Rout-R-Lift. The Rout-R-Lift (and the optional inserts shown at right) is available from:

• Highland Hardware	800-241-6748
• Woodcraft	800-225-1153
• Woodsmith Store	800-835-5084

Scenes from the Shop


MILLERS FALLS COMPANY
GREENFIELD
MASS. U.S.A.

The Millers Falls Company created quite a stir when they introduced this line of tools back in the late 1940's. With their bright red, plastic handles and streamlined appearance, it's easy to see why tool collectors today refer to these as "Buck Rogers" tools, after the space-traveling comic strip character.